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U. S. DEPARTMENT OF COMMERCE
BUREAU OF FISHERIES

REPORT

OF THE

UNITED STATES COMMISSIONER OF FISHERIES

FOR THE FISCAL YEAR 1938

WITH

APPENDIXES

FRANK T. BELL
COMMISSIONER

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NOTE

The first section of this volume, entitled "Bureau of Fisheries," constitutes what was known in years prior to 1933 as "Report of the Commissioner of Fisheries." Since then, in the interests of economy, it is a reprint from the "Annual Report of the Secretary of Commerce." The pagination, therefore, is the same as that of the Secretary's Report, rather than beginning with page 1.

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U. S. DEPARTMENT OF COMMERCE

BUREAU OF FISHERIES

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[Reprinted from the Annual Report of the Secretary of Commerce, 1938]

BUREAU OF FISHERIES

Based on available statistics for 1936, there was a large increase in the catch of fishery products in the United States and Alaska as compared with the preceding year. Statistics of the catch were collected for both 1935 and 1936 in the Chesapeake, Pacific, and Lake States and in Alaska, and when considering the combined catch of these sections alone, an increase of 22 percent in the volume and 19 percent in the value of the catch is indicated. While these increases are reflected in each of the four geographical sections and in many species, they are especially important in increased catches of pilchard in California and salmon in Alaska.

Based on the most recent surveys, our commercial fisheries gave employment to about 129,000 fishermen, whose catch amounted to 4,840,299,000 pounds, valued at $92,823,000. The output of canned fishery products in 1936 amounted to 794,707,000 pounds, valued at $94,564,000, representing an increase of 18 percent in volume and 26 percent in value as compared with 1935; the output of fishery byproducts was valued at $34,976,000, representing an increase of 17 percent; and the production of frozen fishery byproducts, excluding packaged fishery products, amounted to 106,680,000 pounds, estimated to be valued at $8,700,000.

The production of fresh and frozen packaged fish, as based on the most recent surveys, amounted to 202,396,000 pounds, valued at $26,895,000; and cured fish 116,311,000 pounds, valued at $15,616,000. It is estimated that about 680,000,000 pounds of fresh fishery products (excluding fresh-packaged fish and shellfish), valued at about $55,000,000, were marketed during 1936. The total marketed value to domestic primary handlers of all fishery products in 1936 is estimated at about $236,000,000.

Imports of fishery products for consumption during the calendar year 1936 were valued at $41,873,000, which is 16 percent more than in 1935, while exports were valued at $13,214,000, or 8 percent less than in the previous year.

INTERNATIONAL RELATIONS

HALIBUT INVESTIGATIONS

The International Fisheries Commission continued the investigation of the life history of the Pacific halibut, and the investigation and regulation of the Pacific halibut fishery, under authority of the treaty of May 9, 1930, and the supplanting treaty of January 29, 1937. The new treaty, which invested the Commission with new powers and responsibilities, did not become effective until August.

Under authority of the 1937 treaty, new regulations were issued August 11, 1937. These differed from the previous ones in several

respects. They provided for the prohibition of clearance for area 3, when the boats already cleared for fishing were sufficient to catch the limit allowed, and for the setting of a subsequent date of last fishing. They also provided for the retention and sale of a limited proportion of halibut caught incidentally to fishing for other species with set lines in areas closed to halibut fishing. Other changes affected the dates of beginning and termination of the winter closed season.

The Commission recorded the catch from each area, forecast and announced the date of attainment of each area limit and closed the areas accordingly. It issued new regulations on February 26, 1938, changing the regulations of August 1937 by increasing the catch limits in areas 2 and 3 one million pounds each and prohibiting the use of set nets for the capture of halibut.

The investigations necessary for the fulfillment of the purposes of the treaty included the collection and analysis of the current statistical and biological data, which are necessary for the evaluation of the success of regulation and for continued intelligent control of the fishery.

Further improvement in the condition of the stocks of halibut was revealed by the investigations. In area 3, which includes the grounds north and west of Cape Spencer, Alaska, the catch per unit of effort was 19 percent greater than in the previous year and 73 percent greater than in 1930, the year when the abundance of halibut reached its lowest ebb. The catch per unit in area 2, which includes the grounds between Cape Spencer and Willapa Harbor, Wash., was slightly greater than in 1936, and 74 percent greater than in 1930.

Extensive market measurements showed that the reduction in the rate of capture of the fish resulting from regulation had produced a further small increase in the size of the fish landed, which, in conjunction with the general increase in abundance, indicated an increase in the spawning stock on the grounds from the previous year. Analysis of the catches of spawn taken in area 2, by means of quantitative net hauls made from a chartered vessel in the winter of 1936–37, showed an increase over the previous three winters. The net hauls were repeated in the winter of 1937–38 and the results are in process of analysis.

Four publications were issued during the year, one report and three circulars. The report, "Theory of the effect of fishing on the stock of halibut," dealt with the theory that explains the past decline of the fishery and its gradual recovery as a result of present regulation. The circulars "Why are there separate areas?", "Halibut tagging experiments," and "The early life history of the halibut," explain in simple form the results of the investigations of the Commission and their bearing on the regulation of the fishery.

The investigations of the Commission continued to explain the changes taking place in the stocks of halibut on the banks. They prove that the condition of the stocks is still improving, as a result of regulation, and offer new assurance of the ultimate success of the Commission in rebuilding the stocks of halibut to a higher level of productiveness.

JAPANESE ACTIVITIES IN THE BRISTOL BAY FISHERIES

Special attention was given during the past year to Japanese fishing operations in Bristol Bay. A number of floating crab canneries and reduction plants have been operated annually in this area by the Japanese since 1930. Their recent activities in the salmon fishery, however, aroused widespread alarm among the Bristol Bay packers and American fishermen. Grave concern was felt lest the interception of the salmon runs bound for Alaskan streams should jeopardize and eventually destroy the long-established Bristol Bay salmon industry.

Following an extensive investigation, this problem was made the subject of diplomatic negotiations between the State Department and the Japanese Government. As a result, assurances were obtained from Japan that it would suspend its official survey of the salmon fishery in Bristol Bay and would issue no licenses to vessels to take salmon in those waters. Continued attention and careful consideration will be given this development to assure the perpetuation of this important American fishery. Funds have been appropriated by Congress for an extensive survey of the Bristol Bay salmon resources, and plans have been made to start the work in the 1938 season.

INTERNATIONAL PACIFIC SALMON FISHERIES COMMISSION

The American members of the International Pacific Salmon Fisheries Commission were appointed by President Roosevelt on August 24, 1937, pursuant to ratification on July 28, 1937, of a convention between the United States and Canada for the protection, preservation, and extension of the sockeye salmon fishery of the Fraser River system, tributary of the Puget Sound area of Washington and British Columbia. The American members of the Commission are: Charles E. Jackson, United States Deputy Commissioner of Fisheries; B. M. Brennan, Director of Fisheries of the State of Washington; and E. W. Allen, of Seattle, who is also a member of the International Halibut Commission. The Canadian members who have been appointed are: W. A. Found, Deputy Minister of Fisheries; Tom Reid, Member of Parliament from British Columbia; and A. L. Hager, of Vancouver, B. C.

A. L. Hager was elected chairman and B. M. Brennan secretary at the first meeting of the Commission, held in Vancouver, B. C., on October 28 and 29, 1937. It was agreed that the positions of chairman and secretary of the Commission would alternate between the United States and Canada every 2 years. Dr. W. F. Thompson, Director of Investigations for the International Fisheries Commission, was loaned to the International Pacific Salmon Fisheries Commission on a part-time basis to initiate the biological investigations.

Studies by the United States Bureau of Fisheries on the condition and trend of the fisheries were discontinued in February 1938, since the work will hereafter be carried on under the International Pacific Salmon Fisheries Commission.

CONSERVATION OF WHALES

An international conference held in London on June 8, 1937, resulted in the signing of an agreement with respect to whaling. This agree-

ment supplements the International Whaling Convention of September 24, 1931, and provides greater protection for whales. On June 14, 1938, a further conference was called for the purpose of studying the results of the 1937–38 whaling season, and to consider modification or extension of the 1937 agreement. The conference concluded its business on June 24 by signing an agreement affording still further protection to whales. The Senate has not consented as yet to the ratification of the agreement.

A report on whaling statistics, made by the Bureau of Fisheries in accordance with the requirement of the Convention, was published in the consolidated whaling report of the world, International Whaling Statistics XI, issued at Oslo, Norway, June 2, 1938.

NORTH AMERICAN COUNCIL ON FISHERY INVESTIGATIONS

The twenty-fourth meeting of this Council was held at Montreal, Canada, on September 23, 24, and 25, 1937, with representatives from Canada, Newfoundland, and the United States present. Reports were presented by investigators of the various countries setting forth progress made in the long-time investigations of cod, mackerel, and haddock. New research projects sponsored by the Council and reported on for the first time included a study of the migrations of Atlantic salmon, conducted on a cooperative basis by Newfoundland and Canada, and an extensive program of lobster studies in Canadian waters.

The question of an international treaty for the control of mesh size in nets used by Canadian and United States vessels engaged in the haddock fishery has been under discussion by the Council for several years. Although the voluntary adoption of larger meshed gear by the majority of the New England operators during 1937 has relieved the situation to some extent, the Council continues to recommend coordinated international action.

A discussion of hydrology in relation to fisheries investigations emphasized the fact that this subject may prove to be quite separate from the general problem of oceanic circulation with which the physical oceanographer is principally concerned. The Council directed attention to the fact that routine temperature observations have seldom been available from the fishing banks and recommended that the United States, Canada, and Newfoundland devise means of collecting temperature data on the fishing grounds and also consider the advisability of reporting to the fishing fleet from time to time concerning general temperature trends in important areas.

GREAT LAKES FISHERIES CONFERENCE

Progress has been made toward the negotiation of a treaty for the control of the seriously depleted fisheries of the Great Lakes. After nearly 50 years of conferences among the various States attempting to secure uniform regulation by independent State action, a conference was held during February 1938 by members of commissions on interstate cooperation under the auspices of the Council of State Governments. This conference resulted in a definite request directed to the Congress and to the State Department for negotiation of such a treaty. The initial step would provide for the appointment of a

fact-finding commission which doubtless will be instrumental in the drafting of final regulations for the fisheries. At the same meeting progress was made toward the adoption of uniform regulations among the four States bordering on Lake Michigan. Congress subsequently passed legislation which authorized an interstate compact among the Great Lakes States for the preservation of their fisheries.

FISHERY ADVISORY COMMITTEE

The Fishery Advisory Committee, composed of leaders in the fishing industry, organized for the purpose of advising the Secretary of Commerce and the Commissioner of Fisheries concerning the development, promotion, and regulation of the fisheries, continued the study of fishery problems throughout the year.

The lack of current information on market conditions has long been apparent, and the actual establishment of a Market News Service by the Bureau of Fisheries owes much to the recommendations and interest of the committee which foresaw the advantages of this service in the development of a more orderly marketing program for sea foods.

One of the major objectives of the Bureau of Fisheries' investigations is to discover the earliest signs of depletion of a commercial species, since thousands of people are dependent, either directly or indirectly, upon the fishing industry for a livelihood. The problems confronting this group are national and international in scope; many are not easily solved. An outstanding study concerns the difficult problem of the wise exploitation of the pilchard or sardine fishery of the Pacific coast.

The committee has been formulating a long-range program with a view to increasing the year-round consumption of fishery products. A national fish week has been inaugurated and the committee has planned to hold one meeting in a city outside of Washington, D. C., each year. These conferences are resulting in the establishment of closer relations between the industry and Federal agencies concerned, and are affording a better understanding of the problems which the industry is attempting to meet.

DOMESTIC RELATIONS

COOPERATION WITH OTHER FEDERAL AGENCIES

Some half-dozen Federal agencies are concerned with the management of land and water areas where fisheries conservation may be a problem. Outstanding among these are the National Park Service, Forest Service, Tennessee Valley Authority, Farm Security Administration, Bureau of Reclamation, and the Indian Service. The Bureau has worked with each of these in the solution of their problems.

The Forest Service has constructed during the year more than one-half dozen rearing units which the Bureau operates for the protection of fish to stock park waters. More are under construction and being planned. The existing T. V. A. hatchery at Norris, Tenn., is of insufficient capacity and work has just been started on a large new unit on the Elk River in Alabama. This will be operated by the Bureau and the affiliations with this agency have been most beneficial. The Farm

Security Administration has made preliminary arrangements for transfer to the Bureau of the large hatchery unit at Welaka, Fla. The Bureau has in return supplied fish from its various hatcheries for stocking the waters of recreational projects. Close contact has been maintained in the development of a bass hatchery at Arcadia, R. I., and a program of joint development has been worked out. A hatchery at Hoffman, N. C., was taken over by the Bureau under a similar arrangement.

The Bureau has been the recipient of aid from other Federal agencies. Civilian Conservation Corps enrollees have contributed work at various hatcheries. The Works Progress Administration can, in a number of instances, be credited with improving the physical condition of the Bureau's properties and providing additional facilities for fish production.

During the past year, the Bureau's technologists gave courses in canning fishery products to State extension service workers at the request of the United States Department of Agriculture. They also rendered considerable assistance to the Bureau of Home Economics of the United States Department of Agriculture in assembling data on the chemical composition and food value of the leading commercial species of fish and shellfish. These data are to be incorporated by the Bureau of Home Economics in a revised publication on the composition of principal American food materials. Chemists of the Food and Drug Administration, United States Department of Agriculture, conferred at length with the Bureau's technologists for the purpose of obtaining information on methods of determining fatty acid in fish meal and the effect of the presence of relatively large amounts of fatty acid in fish meal on its feeding value. The Bureau also cooperated with the Federal Surplus Commodities Corporation in connection with its purchase of surplus fish for relief agencies and with the distribution of this fish to relief clients. The International Fisheries Commission at Seattle, Wash., cooperated in the conduct of several phases of the Bureau's economic and technological work. This included certain technical studies on halibut and halibut liver oil and the collection of economic and statistical data on the North Pacific halibut fishery.

The Division of Fishery Industries assisted the Rural Electrification Administration in studies of the commercial fisheries in certain areas of Virginia and North Carolina, and assisted the Bureau of Chemistry and Soils of the United States Department of Agriculture in assembling historical data relating to the domestic manufacture of fish scrap and meal.

The Bureau also has worked with various Federal agencies in obtaining statistical data on our fisheries. In a cooperative arrangement, the Bureau of Agricultural Economics, Department of Agriculture, furnished statistics on the volume of cold-storage holdings of fish and quantities frozen, and the health authorities in Washington, D. C., assisted in obtaining data on the volume of fish handled at the municipal fish wharf and market in this city. Cooperation was accorded the Bureau of the Census in obtaining for that Bureau figures on the volume of the quarterly production and holdings of fish oils in the United States.

COOPERATION WITH STATES AND OTHER AGENCIES

An important part of the duties of the field employees of the Division of Fish Culture has been to maintain close cooperation with State fish and game departments for the purpose of coordinating the fish propagation and distribution activities. Similar contacts were maintained with semipublic sportsmen's organizations.

Many State fish and game departments continued to check and review Federal fish applications for their waters. Others exchange eggs and fish with the Bureau or operate hatcheries on a joint basis. In a number of instances the distribution of fish produced at Federal hatcheries is handled by the State organizations.

New developments along the foregoing lines included the assignment of a skilled Bureau employee to take charge of a new bass hatchery constructed by the West Virginia Conservation Department at Palestine, W. Va. Part of the fish produced will be used for filling Federal applications in that State. When the Missouri Conservation Department was unable to continue operation of the Forest Park Hatchery in St. Louis, the Bureau assumed the obligation and placed an employee in charge.

A tripartite agreement for operations at the brook trout hatchery at York Pond, N. H., was continued in effect with New Hampshire and Vermont. Shad propagation was undertaken in Georgia, the State cooperating financially.

Sportsmen's organizations have looked to the Bureau for guidance in their stocking problems in an increasing degree. The opening of a trout-rearing and bass-propagating unit at Carpenters Brook, in Onondaga County, N. Y., was the culmination of protracted efforts on the part of the county authorities, the organized sportsmen, and the Bureau. With a Federal employee stationed there, the stocking requirements of this community will be adequately cared for. W. P. A. labor and funds were utilized for construction.

The National Planning Council of Commercial and Game Fish Commissioners, organized at St. Louis, Mo., in 1933, continued its cooperative work with the States.

The annual council meeting which was held during the week of June 20 at Asheville, N. C., was combined with the International Association of Game Fish and Conservation Commissioners and the American Fishery Society, with representatives from 46 States present.

Among the activities of the National Planning Council of special interest and importance, from the standpoint of State cooperation, has been the benefits to the Bureau resulting from the elimination and overlapping in fish distribution work.

Subjects of national importance before the organization at the present time are: Fish management, fish culture, shad conservation, pollution problems, Great Lakes fisheries, and the technical problems of fishery research.

In its technological work, the Bureau has carried on cooperative investigations with several colleges and universities and other State institutions. In these cooperative projects the scientific staffs and other facilities of these agencies were available to the Bureau's staff. Among the institutions cooperating in these investigations are: Wash-

ington State College, Pullman, Wash.; University of Washington, Seattle, Wash.; University of Maryland and Maryland State Agricultural Experiment Station, College Park, Md.; and the Minnesota and Virginia State Departments of Markets.

CONSTRUCTION ACTIVITIES

The major construction activities during the year were concentrated upon five new hatcheries. In the Columbia National Forest, near Carson, Wash., a salmon and trout hatchery started during the fiscal year 1937 was completed as far as available appropriations would permit. A hatchery service building, two dwellings, the water system, and several rearing ponds were completed. This new project was necessitated by the partial overflow of the older Little White Salmon hatchery from the waters of the Bonneville Dam pool.

Work was also started on four new pondfish hatcheries located at Lyman, Miss., Marianna, Fla., Cohutta, Ga., and Las Vegas, Nev. These were established in conformity with the act of May 21, 1930, Congress having provided for a resumption of new hatchery development. The Mississippi hatchery was placed on an operating basis during the year, although the proposed pond system was not entirely completed. In Florida about 50 percent of the ponds were completed, and dwellings, service buildings, water supply facilities, etc., were well along toward completion at the end of the year. This hatchery is located in a State park, the site having been donated.

Due to delay in acquiring the site, the Georgia hatchery was less completely developed both as to ponds and buildings at the close of the year. The appropriation of additional funds permitted the construction to continue into the fiscal year 1939.

At Las Vegas, Nev., the Bureau took over a hatchery which had been started by the city of Las Vegas. The principal work required was the construction of a dwelling, shop, and garage, and extension of the pond system. The greater part of this had been accomplished by the close of the year. Output of this hatchery will be largely used in restocking Lake Mead.

A site suitable for a bass hatchery in Rhode Island was finally acquired from the Farm Security Administration. A little work was performed in clearing pond sites, but this was suspended for the purpose of developing a project of major construction by utilization of relief labor. W. P. A. aid was enlisted in providing for major improvements at three existing hatcheries. At Edenton, N. C., the work comprised a 100-percent increase in the bass-pond acreage and construction of two experimental rearing ponds for shad. At Hartsville, Mass., and White Sulphur Springs, W. Va., a complete rehabilitation of ponds, buildings, and grounds was undertaken. In addition, W. P. A. projects were set up to provide for minor specific repairs and improvements at a number of other hatcheries, notably at San Angelo, Tex., Rochester, Ind., Dexter, N. Mex., and Crawford, Nebr. By the same means, pond construction was continued in the Upper Mississippi Wild Life and Fish Refuge at Genoa, Wis.

A fine stone hatchery building was practically completed at Lamar, Pa., financed by Bureau funds and C. C. C. labor. A series of bass ponds was also started at this point. At York Pond, N. H., a com-

bination of C. C. C. and W. P. A. labor made possible the continuation of the long-range developmental program.

With the installation of hatching troughs and completion of the dwellings by the United States Forest Service, the Walhalla, S. C., hatchery reached its final stage of development.

ALASKA FISHERIES SERVICE

ADMINISTRATION OF FISHERY LAWS AND REGULATIONS

The excellent condition of the fisheries of Alaska in 1937 reflects the wisdom of conservation policies which have been in effect since 1924. The salmon industry, which is the backbone of Alaska's economic structure, produced the third largest pack on record, and other minor fisheries also continued on a high level of development. Commercial fishing operations in 1937 were closely checked in all areas, and regulations were amended where necessary to assure an adequate escapement of brood fish. The Deputy Commissioner of Fisheries and other officials spent several weeks in Alaska inspecting the fisheries and the Pribilof Islands fur-seal industry.

Revised fishery regulations for 1938, issued on February 15, contained only minor changes from the regulations in force in 1937. The restrictions on herring fishing in southeast Alaska were relaxed to some extent, while additional restrictions were placed on herring fishing in the Kodiak and Prince William Sound areas. In a few instances areas open to trap fishing were redefined in order to relieve the drain on certain runs and more nearly equalize the intensity of fishing operations. Clam-fishery regulations were modified to permit a slight increase in the take of razor clams in the Prince William Sound, Copper River, and Bering River areas.

A patrol of the fishing grounds was maintained by 14 Bureau vessels, 1 chartered vessel, and numerous small craft. Twelve statutory employees and 165 temporary stream guards and special workmen, in addition to the crews of the patrol vessels, were engaged in enforcing the fisheries laws and regulations in Alaska. As in previous years, some use was made of airplanes to supplement the vessel patrol and to transport Bureau employees to isolated districts.

No collection of salmon eggs for artificial propagation has been made in Alaska during the past 2 years. The conditions for natural propagation of salmon, however, have been improved by the removal of log jams and other obstructions that hindered the passage of salmon upstream, and by the destruction of predatory enemies of salmon. Funds were made available by the Territorial legislature and by local packers for the payment of a bounty on predatory trout taken in the Bristol Bay and Cook Inlet areas in 1937. In this connection also the Bureau began a scientific study of the migratory habits of Dolly Varden trout in order to provide a rational control program.

Biological studies of salmon and herring were continued and weirs were operated in 12 representative salmon streams to count the escapement of brood fish. The information obtained by weir counts is necessary in determining conservation measures and is also of great value in connection with the life-history studies of salmon.

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PRODUCTS OF THE FISHERIES

The total output of Alaska fishery products in 1937 was 452,544,700 pounds, as compared with 523,652,500 pounds in 1936. Notwithstanding this decrease in volume, the value of fisheries products in 1937 was $51,743,200, an increase of $1,287,950 over the preceding year. Production of canned salmon in 1937 was the third largest ever recorded, having been exceeded only in 1934 and 1936, and the output of herring products set a new high record for the Territory. There were 30,331 persons engaged in the fishing industry of Alaska in 1937.

Salmon products accounted for 75 percent of the total weight and 90 percent of the total value of Alaska fisheries products in 1937. Ninety-four percent of the salmon production consisted of canned salmon, the pack amounting to 6,669,665 cases, valued at $44,547,769. This compares favorably in point of value with the record pack of the previous year, which amounted to 8,437,603 cases, valued at $44,751,633. Red salmon comprised 32 percent and pinks 54 percent of the total pack in 1937, as compared with 30 and 54 percent, respectively, in 1936. One hundred and thirteen canneries were operated, or four less than in the preceding year, and the number of persons employed declined from 25,221 to 24,865 in the same period.

Twenty herring plants were operated in 1937, a decrease of 7 from the preceding year, but the total production of herring meal and oil was the largest in the industry's history. Saltery operations, however, were sharply curtailed, chiefly as a result of unfavorable market conditions. There was a slight decrease in the volume of halibut landings, and the output of cod and shrimp products also declined, but production in other minor fisheries of the Territory, including crabs, clams, and sablefish, showed substantial increases. The two whaling plants which operated in 1937 also reported a slight increase in production over 1936.

ALASKA FUR-SEAL SERVICE

GENERAL ACTIVITIES

Sealing and foxing operations were carried on as usual by the native inhabitants of the Pribilof Islands under the direction of the Bureau's staff. Twenty-six skilled employees of the Fouke Fur Co. were detailed to the island for several months to assist in the curing and packing of the skins.

Construction activities on the island were rather limited in 1937. Work on the extension of roads was continued, and minor improvements were made on buildings and equipment. A substation was established on Amchitka Island, one of the western Aleutian group, to serve as a base for sea otter investigations and patrols.

The byproducts plant on St. Paul Island was operated for the utilization of fur-seal carcasses and produced 29,830 gallons of oil and 165 tons of meal. Small quantities of these products were retained at the islands to be used during the winter for fox feed, but most of the oil was sold in Seattle for the account of the Government, and meal was transferred to the Division of Fish Culture for use as fish food in Federal hatcheries.

The annual supplies for the Pribilof Islands were shipped from Seattle on the U. S. S. *Sirius*, through the cooperation of the Navy Department. On the return trip to Seattle this vessel carried the season's take of sealskins and 162 tons of seal meal from the by-products plant.

As the Navy Department's radio facilities at Dutch Harbor, Alaska, have recently been expanded, the maintenance of the St. Paul Island station as a link in the Coast Signal Service is no longer necessary. The St. Paul station was therefore transferred on August 10, 1937, to the Department of Commerce, under a revocable permit, and is being operated on a reduced scale by the Bureau of Fisheries.

In accordance with the terms of the fur-seal treaty of 1911, delivery of 8,277 fur-seal skins, or 15 percent of the season's take, was made to the Canadian Government. Japan continued to receive its 15 percent share in the take from the proceeds of sale of the remaining skins. The United States received a shipment of 210 Robben Island fur-seal skins, taken by Japan in 1937. This represented the annual 10 percent share due this country under the terms of the fur-seal treaty.

SEAL HERD

The total number of animals in the Pribilof Islands fur-seal herd on August 10, 1937, was computed as 1,839,119. This is an increase of 149,376 over the computed number in the preceding year.

TAKE OF SEALSKINS

In the calendar year 1937 there were taken on the Pribilof Islands 55,180 fur-seal skins, of which 44,068 were taken from St. Paul Island and 11,112 from St. George Island. This is an increase of 2,734 over the total taken in 1936. Insofar as possible, killings were from the 3-year-old males, a suitable number of this age class having been reserved for breeding stock.

SALE OF SEALSKINS

Two public auction sales of fur-seal skins were held at St. Louis, Mo., in the fiscal year 1938. At the sale on September 27, 1937, there were sold 7,000 skins dyed black, 12,580 skins dyed Safari brown, and 147 miscellaneous skins, for a gross total of $420,640. On May 2, 1938, 7,100 skins dyed black and 12,849 dyed Safari brown brought a gross sum of $432,622.25.

Sealskins sold at private sales under special authorization by the Secretary of Commerce consisted of 474 dyed black, 398 dyed Safari brown, and 2 raw salted skins, which brought a gross sum of $21,-102.81. In all, 40,550 fur-seal skins were sold for the account of the Government in the fiscal year 1938, for a total gross sum of $874,365.06.

FOXES

The blue fox herds maintained on St. Paul and St. George Islands continued to thrive, and the taking of fox pelts provided the natives with employment during the relatively inactive winter months. The herds require very little attention and are a profitable adjunct to the

fur-seal industry. During the 1937–38 season 231 blue and 15 white foxskins were taken on St. Paul Island, and 616 blue and 1 white fox pelt were taken on St. George Island. Sufficient stocks were reserved on each island for breeding purposes.

One thousand blue and 12 white foxskins, taken on the Pribilof Islands in the 1936–37 season, were sold at public auction in the fiscal year 1938. The blue foxskins brought $25,934 and the white skins brought $146, a total gross sum of $26,080.

FUR-SEAL SKINS TAKEN BY NATIVES

Exercising the privilege granted them under the provisions of the North Pacific Sealing Convention of July 7, 1911, the aborigines dwelling on the coast of the North Pacific took a total of 2,832 fur-seal pelts in 1937. Indians under the jurisdiction of the United States took 161 skins and Canadian Indians took 2,671. All these fur-seal skins were duly authenticated by Government officials of the two countries.

FUR-SEAL PATROL

Vessels of the Coast Guard were again assigned by the Secretary of the Treasury to patrol the waters of the North Pacific and Bering Sea for the protection of the fur seals and sea otters in those areas. One vessel of the Bureau of Fisheries also participated in the fur-seal patrol during the northward migration of the herd.

PROTECTION OF SEA OTTERS, WALRUSES, AND SEA LIONS

A new edition of the regulations for the protection of walruses and sea lions was issued on July 1, 1937, extending the closed season on these animals for 2 years, although permitting their capture, as heretofore, under certain specified conditions. The killing of sea otters is prohibited at all times.

PROPAGATION AND DISTRIBUTION OF FOOD AND GAME FISHES

The hatcheries operated by the Division of Fish Culture released for the stocking of public waters during the fiscal year 1938 a total of 7,822,151,800 fish and eggs. This represents a slight regression, approximately 1.2 percent, from the comparable output of the previous year. The 1938 production has, however, been exceeded only twice during the period in which the Federal Government has operated fish hatcheries. In view of the effects of weather, and other factors beyond control, there is each year an inevitable fluctuation in the output of the hatcheries. Among the factors which may be cited as contributing to the reduction and output was the flooding of the Louisville, Ky., hatchery during the spring of 1937, thereby affecting the 1938 production. In the Madison River, Mont., a large supply of trout eggs was virtually eliminated because of drainage of a hydroelectric reservoir. The cyclical nature of the runs of Pacific salmon also contributed to a reduced egg take for those species. Altogether some 45 different species of fish were handled at the Bureau's hatcheries. The canalization of the upper Mississippi River has curtailed the rescue

work in the Upper Mississippi Wildlife Refuge. This was reflected in a reduction of distribution of warm-water pondfish and also in the distribution of a larger-size fish listed as fingerlings. The fingerling output of 118,105,000 was approximately 18,000,000 less than the previous year. The output of game fish as a whole held up most successfully. The demand for game fishes for stocking waters on Federal lands has increased to the extent that many applications from private applicants had to be carried over for subsequent attention.

PROPAGATION OF COMMERCIAL SPECIES

Marine species, Atlantic coast.—The output of haddock and pollock, and important species of the New England shore waters, was increased. This increase was balanced by a reduction in the propagation of cod and flatfish. Lobster propagation was prosecuted more vigorously at Boothbay Harbor, Maine, and Gloucester, Mass., with a resultant production of 6,800,000 fry. No mackerel were propagated by the marine stations during 1938. As usual, much of the propagation of marine species was concerned with the fertilization of eggs and their immediate planting on the natural spawning grounds. Over 4½ billion eggs were salvaged by this procedure.

Pacific salmon.—It is especially regretful that there was a notable drop in the propagation of chinook and sockeye, the most valuable species of the Pacific salmons. However, the annual fluctuation in the runs of these fish determines the egg take, which in turn controls the hatchery distribution. In connection with the salmon hatchery operation, steelhead trout were propagated in large numbers.

Anadromous species, Atlantic coast.—In line with an intensive study of the biology of the shad, and a definite program of rehabilitation of the species, the output of shad fry was materially increased to a total of 26,000,000. Increases were registered at the Fort Belvoir, Va., station and at Edenton, N. C., and scattering numbers were propagated in South Carolina and Georgia, the latter being a new activity conducted in cooperation with these States. Work with the Atlantic salmon was negligible, due to inability to obtain any worth-while quantity of eggs. Yellow perch and white perch were hatched in large numbers in the shad hatcheries, since these species can be handled at little additional cost in connection with the propagation of the more important shad. Effort was again made to propagate striped bass on the Roanoke River in cooperation with the State of North Carolina. Moderately successful results were obtained.

Commercial species, interior waters.—Several hundred million eggs and fry of the catfish, buffalo fish, and carp varieties were distributed, purely as a byproduct of the Bureau's other work in the upper Mississippi area. It would have been possible to increase the output of these had such action been deemed desirable. Owing to uncertainty as to the role of the hatcheries in maintaining the more valuable species of the Great Lakes, there was no increase in intensity of effort to hatch whitefish and lake herring. Seventy-four and one-half million whitefish fry represented a yield somewhat below the previous year. The propagation of pike-perch at the Put in Bay, Ohio, station, in cooperation with the State of Ohio, was resultant of

a reduced output. The feature seriously affecting the work on Lake Ontario is the fact that the most suitable spawning area for whitefish and lake trout is in Canadian waters and no satisfactory arrangements can be made whereby the Bureau can obtain eggs from that source. Similar limitations kept the production of lake trout at a low level.

Game species.—A large increase in the production of black-spotted trout was made possible through increased egg collections at Yellowstone Park. The greater portion of these fish were distributed in National Park waters. Fewer brook, rainbow, and loch-leven trout were distributed, but many of these were planted at large size, increasing their value for stocking purposes. Efforts to develop a satisfactory and economical trout food under actual operating practices have continued. An important feature of the Bureau's work with game fish is the assignment of trout eggs, particularly of the rainbow trout, to various other fish-cultural agencies. Shipments of rainbow trout eggs and panfish were made to Puerto Rico, while eggs of various species were supplied to Venezuela and Argentina. It is again gratifying to report that the production of bass, a species which merits its great popularity among the sportsmen, exceeded all previous records.

It should be pointed out that practically all new hatchery developments within recent years, exclusive of some minor developments in the Pacific salmon area, have been for the propagation of game species. This is due to the fact that the fishes sought for sport are largely denizens of the lesser fresh waters. They are consequently more vulnerable to the increased fishing pressure of recent years, and, further, suffer from environmental changes, such as pollution, which mark our national development.

Since hatchery efforts are wasted unless the fish are stocked properly, more intensive consideration was given to the distribution problem. Eight large trucks were acquired, as the nucleus of a fleet, and these were being equipped with special tanks and apparatus at the close of the year. Attempts to economize by inducing private applicants to transport their allotments of fish have been unsatisfactory, due chiefly to the applicants inexperience in handling live fish.

RESCUE OPERATIONS

Due to the development of the 9-foot channel in the Upper Mississippi River, the number of fish rescued in that area was below that of 1937. However, there were salvaged a total of 42,202,000 fish, comprising 10 species. Of this number over 41½ million were returned directly to the main river channels.

The canalization of the Mississippi to the Twin Cities will make the salvage work virtually unnecessary and impossible in the future. In lieu of this the Bureau is constructing large artificial ponds for the propagation of fish in the areas adjacent to the pools created by the new dams. The ponds already constructed and operated have proved very successful. The two in operation at Genoa, Wis., last year produced over 864,000 fingerling black bass alone.

FISHERY INDUSTRIES

ECONOMIC AND MARKETING INVESTIGATIONS

Surplus fish situation.—A study of the surplus fish situation showed that on March 15, 1938, holdings of frozen, cured, and canned fishery products in the United States amounted to approximately 260,000,000 pounds, which was about 80 to 100 million pounds greater than normal holdings.

Improved cold-storage statistics.—The Bureau of Fisheries, in cooperation with the Bureau of Agricultural Economics of the Department of Agriculture, has made several revisions in the species classifications of commodities frozen or held in cold storage in this country. These changes, which are reflected in the monthly and annual cold-storage bulletins published by the Bureau, increase the usefulness of these data to interested parties. Recently, separate classifications were adopted for fillets of various species, and new classifications were added for rosefish and swordfish. On July 15, 1938, additional classifications will be included for scallops, shrimp, and sea crawfish or spiny lobsters.

United States fisheries off foreign coasts.—A study made during the year shows that about 14 percent of the value of the catch of the domestic fisheries is represented by products taken off foreign coasts. Outstanding among such commodities are cod, haddock, and other groundfish taken off the coasts of Newfoundland and Nova Scotia, which were valued at $4,600,000, and tuna and tunalike fishes taken off the west coasts of Latin America, valued at $5,900,000. Other domestic fisheries off foreign coasts include those for salmon and halibut off British Columbia; the fishery for red snapper and groupers on Campeche Bank off Mexico; and the whale fishery off Australia. The total value of domestic fisheries off foreign coasts to domestic fisherman amounted to about $13,000,000.

Commercial fisheries of the world.—On the basis of the most recent available data, the world's annual commercial catch of fishery commodities amounts to about 30,000,000,000 pounds, valued at approximately $730,000,000. The United States, including Alaska, ranks first in value of the annual yield and is exceeded only by Japan in volume.

Fishery market news service.—Offices for the daily collection and dissemination of fishery market news were established at New York, N. Y., and Boston, Mass., during the past year. Plans for opening the third office, at Seattle, Wash., were nearing completion at the end of the fiscal year, and other offices, within the facilities of the Bureau, will be opened during next fiscal year. Essentially, this new service, which has proved most popular, constitutes an exchange of market information between the fishermen or producers in fishing areas and the middlemen in terminal markets, with the Bureau of Fisheries acting as the service agency; that is, the agency for collecting and disseminating the news.

Cooperative marketing.—In connection with the administration of Public, No. 464, "An Act authorizing associations of producers of aquatic products," investigations have been continued to determine

the cooperative status of fishery organizations in the United States, and the extent and nature of their activities. Studies pertaining to fishery associations and the financing of fishermen, which were begun in 1936 on the Pacific and Middle and North Atlantic coasts, have been extended to include the South Atlantic and Gulf coasts. It has been found among fishermen and associations visited that there is widespread interest in the possibilities of advancing cooperative marketing activities. This interest has been evidenced further by many requests for the Bureau to give aid of an advisory character concerning operations and management and financing problems. Wherever possible, such assistance has been supplied through correspondence, informative literature, or personal contact.

STATISTICAL INVESTIGATIONS

FISHERIES OF THE UNITED STATES, CALENDAR YEAR 1936

New England States.—No complete statistical survey of the commercial fisheries of this area was made for 1936. However, the total landings by United States fishing vessels at Boston and Gloucester, Mass., and Portland, Maine, amounted to 414,767,000 pounds, valued at $11,144,000, an increase of 11 percent in volume and 24 percent in value as compared with the preceding year.

Middle Atlantic States.—No complete survey for the catch of fishery products in these States was made for 1936. A survey made of the shad fishery of the Hudson River for 1936 showed that 476 fishermen took 2,468,000 pounds of shad, valued at $170,000, an increase of 191 percent in volume and 139 percent in value as compared with 1935.

Chesapeake Bay States.—The commercial fisheries of Maryland and Virginia in 1936 gave employment to 18,283 fishermen. Their catch amounted to 314,095,000 pounds, valued at $6,488,000, an increase of 18 percent in volume and 17 percent in value as compared with the catch in the previous year.

South Atlantic and Gulf States.—The commercial fisheries of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas, during 1936, gave employment to 29,006 fishermen. Their catch amounted to 556,993,000 pounds, valued at $13,542,000, an increase of 24 percent in volume and 36 percent in value as compared with the catch in 1934, when the last previous survey of catch was made.

Pacific Coast States.—During 1936 the commercial fisheries of Washington, Oregon, and California gave employment to 20,620 fishermen, whose catch amounted to 1,925,342,000 pounds, valued at $24,882,000, an increase of 15 percent in volume and 8 percent in value as compared with 1935. The total catch of halibut by United States and Canadian vessels amounted to 48,054,000 pounds, valued at $3,603,000, an increase of 5 percent in volume and 11 percent in value as compared with the catch in the preceding year.

Lake States.—In 1936 the commercial fisheries of the United States and Canada, in the Great Lakes and international lake of northern Minnesota (Lakes Ontario, Erie, Huron, Michigan, and Superior, and Namakan and Rainy Lakes, and Lake of the Woods), yielded 124,408,000 pounds of fishery products. Of the total, United States fishermen took 94,277,000 pounds, valued at $6,389,000, an increase of 4

percent in volume and 7 percent in value as compared with the catch in the previous year. The Lakes fisheries of the United States gave employment to 5,623 fishermen in 1936.

Mississippi River and tributaries.—No complete survey of the commercial fisheries of the Mississippi River and tributaries was made for 1936. The catch of Lake Pepin and Lake Keokuk, and the Mississippi River between the two lakes, in 1936, amounted to 8,181,000 pounds, valued at $378,000, an increase of 22 percent in volume and 34 percent in value as compared with the catch in these waters during 1935.

MANUFACTURED PRODUCTS OF THE UNITED STATES AND ALASKA, CALENDAR YEAR 1936

Fresh and frozen packaged fishery products.—Based on data for 1936, except in the case of packaged shellfish in the New England and Middle Atlantic States, which data are for 1935, the domestic production of fresh and frozen packaged fishery products amounted to 202,396,000 pounds, valued at $26,895,000. Important commodities in this group were fresh-shucked oysters, 6,758,000 gallons, valued at $9,249,000; packaged haddock, 41,187,000 pounds, valued at $4,266,000; and fresh-cooked crab meat, 7,095,000 pounds, valued at $2,535,000.

Frozen products.—In 1936 the production of frozen fishery products amounted to 179,274,000 pounds, estimated to be valued at $15,000,000. The volume of the production was 20 percent greater than in 1935. The most important products frozen were groundfish, whiting, halibut, salmon, and mackerel.

Cured products.—The production of cured fishery products, based on data for 1936 in all sections except the New England and Middle Atlantic States, which are for 1935, and the Mississippi River and its tributaries, which are for 1931, amounted to 116,311,000 pounds, valued at $15,616,000. Important products in this group were smoked salmon, 8,753,000 pounds, valued at $2,656,000; mild-cured salmon, 11,550,000 pounds, valued at $2,245,000; and salted boneless cod, 7,951,000 pounds, valued at $1,492,000.

Canned fishery products.—Canned fishery products produced in 1936 amounted to 794,707,000 pounds, valued at $94,564,000, an increase of 18 percent in volume and 26 percent in value, as compared with 1935. Canned salmon was the most important item, accounting for 430,328,000 pounds, valued at $50,061,000. Other leading canned fishery products were tuna and tunalike fishes, sardines, shrimp, mackerel, clam products, and oysters.

Byproducts.—Fishery byproducts produced in 1936 were valued at $34,976,000, an increase of 17 percent as compared with the previous year. Important products in this group were marine-animal oils and meals and aquatic-shell products.

TECHNOLOGICAL INVESTIGATIONS

Preservation of fishery products for food.—During 1937, studies in this field included a further development of electrometric tests for the freshness of fish and their practical or commercial application, studies of rancidity in fish, of lactic acid as a possible index of decomposition in frozen fish, of identification of canned salmon, of changes in the composition of pink salmon, and of the canning of aquatic products. Much interest was shown by the industry during the past year in the

commercial application of the electrometric method for determining the relative freshness of such nonoily fish as haddock developed several years ago by members of the Bureau's technological staff. Consequently, one of the Bureau's technologists was assigned to the laboratories of a large fishery producer, and, as a result, equipment has been designed which is as nearly automatic in operation as is possible and which enables the operator to make determinations upon 10 samples of fish at one time. In this way rapid tests for the freshness of fish purchased can be made without delaying packing activities or other commercial operations. At the present time this test is being used by this firm for the selection of fish which are to be used in fancy packs of quick-frozen products. These products are expected to remain in good condition over a longer period of time than is ordinarily expected where the fish are not selected for their prime condition. One of the changes occurring in fish immediately after death is an increase in the formation of lactic acid, which progresses for some time after death. Bureau technologists have begun a study of this formation of acid as a possible reliable index of the rate of decomposition in frozen fish.

Certain species of salmon undergo considerable apparent physical change during the course of the canning season and the quality and value of the canned product is at present judged somewhat on this basis. The Bureau has undertaken a chemical study of these changes in the hope of determining their true significance. In studying the characteristics of the oil in canned salmon, it was found that those for each species fell between quite definite and more or less separated limits. Regulatory bodies have shown interest in these data as a possible help in identifying the species of salmon after it is canned. During the year the Bureau published a report covering an investigation on the preservation of Pacific oysters. The information obtained during the conduct of this work has been helpful in the beginning of a new oyster-freezing industry in the Pacific Northwest. During the past year experiments have been continued in developing methods for canning fishery products, both in the home and for application on a commercial scale.

Bacteriological studies.—Since the preservation of fish is based on the prevention of spoilage through bacterial action, any device or method which can be found to serve this purpose is vitally important to both the fishing industry and ultimate consumer. Studies on other food products indicate that the use of ultraviolet light rays have been beneficial in lowering the number of spoilage bacteria in milk, meats, bread, etc., thus improving the quality of these foods. Late in 1937 the Bureau's bacteriologists began a study of these ultraviolet light rays in reducing the bacterial count of various fishery products. While this investigation is not yet completed, it has been found that the rays will kill marine bacteria, and we hope to work out a practical and commercially feasible application of this method in the treatment of fishery products.

Pharmacological studies.—In recent years scientific investigators have recognized the increasing importance of the role of minerals in foods and in feedstuffs for farm animals. Certain minerals have been found to be essential in nutrition, and it has been clearly demonstrated that there is need for a better understanding of other

physiological effects which these minerals may have on the animal organism. For this reason an investigator, trained in pharmacology, was assigned to the Bureau's technological staff several years ago. Studies of the arsenic and copper content of shrimp and oysters, and their physiological or pharmacological effect, have revealed that no deleterious effects are observed as a result of eating these products when these minerals occur in natural organic combination. Similar studies are now being conducted on the natural fluorine content of fishery products.

Preservation of fishery byproducts.—During the year additional data were obtained on the properties and composition of salmon oils. A simple method was developed for the commercial extraction of oil from lean fish livers which do not give up oil by normal treatment. Since the livers yielding the most potent vitamin oils come under this classification, the value of such information can be appreciated. The studies on liver oil extraction also led to practical suggestions on methods for fortifying low-vitamin fish oils. Fish oils and oil-bearing fishery products are subject to oxidative deterioration during storage, and the matter of preventing such changes is an important problem of the fishing industry. Further studies have been made on the effectiveness of various materials for inhibiting oxidative change. The oxidation of fat in fish meal causes it to become insoluble in normal fat solvents. This leads to errors in analysis and confusion when sales are based on analytical specifications. Studies are being made to devise an analytical procedure which will eliminate this difficulty. During the year the Bureau published a report on the distribution of vitamins in salmon cannery waste and contributed papers to scientific and trade magazines covering such subjects as the utilization of salmon cannery waste, cereal flours as antioxidants for fishery products, and the determination of fat in fish meal.

Fish cookery.—During the past year, the Bureau continued the development and testing of recipes for the preparation and cookery of fish and shellfish, and carried on practical demonstrations in fish cookery in cooperation with home economics workers and others in various parts of the country. In cooperation with the Federal Surplus Commodities Corporation, some practical demonstrations in fish cookery were conducted for relief workers and others interested in connection with the distribution of fish to persons on relief rolls.

BIOLOGICAL FISHERY INVESTIGATIONS

INVESTIGATIONS OF COMMERCIAL FISHES

North Atlantic fishery investigations.—Biological studies in the North Atlantic area are concerned chiefly with changes in abundance of the stocks of fish which support New England's extensive and varied fisheries. Specific problems investigated during the year dealt with the causes of the extreme fluctuations in abundance of mackerel and means of predicting such fluctuations; the relation between the existing stocks of haddock and the strain imposed by the present intensive fishery; the economic and biological significance of the extension of otter trawling to include several species in addition to cod and haddock; and the condition of the flounder fisheries in coastal waters from Massachusetts to New York.

In contrast to the record yield for the calendar year 1936, the catch of the New England vessel fisheries during 1937 declined by 6 percent and brought the fishermen a monetary return 12 percent below the value of the previous year's catch. With the exception of cod and flounders, the yield of all important species suffered a decline, and all species except halibut, mackerel, and redfish decreased sharply in value.

The outstanding event of the year in this area was the decline of the mackerel catch to an unforeseen low which was about one-third of the previous year's level. It is believed this small yield was the result of unusual oceanographic conditions which affected the movements of the mackerel and made them less available to the fishermen, rather than of an actual decline in abundance of corresponding magnitude. This view is supported by the peculiar distribution of the 1937 catch and by the good early season yield in 1938. Nevertheless, these developments emphasize the need for a more accurate mackerel catch forecast. Facilities are lacking for off-shore observations on conditions in the sea which affect migrations, survival of young, and availability of the mackerel to the fishermen.

Not only did the total catch of the haddock fleet decline in 1937 by 5 percent from 1936 level, but also the daily catches of trawlers showed a drop of about 20 percent in both major producing areas. The scrod haddock (the smallest commercial size) continued to be scarce on the Nova Scotian banks, being only about three-fourths as abundant on Georges as in 1936, and it is believed that the decline will continue. Without further information on the numbers and distribution of haddock of precommercial size, however, no definite prediction can be ventured for the 1938 season. Although facilities for such a survey were completely lacking in 1937, one experimental trawling trip was made in the spring of 1938 through the courtesy of the Woods Hole Oceanographic Institution in permitting the use of the vessel *Atlantis* for this purpose.

Because of recent sharp changes in the stock of flounders, a survey of the flounder fisheries from New York to Boston was carried to completion during the year, catch data from both sports and recreational fisheries being collected. Highly significant figures on the relative intensity of these two types of fisheries were obtained from the returns of tagging experiments carried out in cooperation with the States of Rhode Island, Connecticut, and New York. An average of about 70 percent of the returns have been made by sportsmen. The same experiments have supplied information on the extent and character of flounder migrations which will aid in devising effective conservation measures.

Middle and South Atlantic fishery investigations.—Headquarters for the investigation of the coastal fisheries from New York to Florida were transferred during the year from Cambridge, Mass., to College Park, Md., permitting a more centralized attack on the urgent problems of fishery management. In this area total production has not only failed to increase, but has actually declined during the present century, despite economic and technological developments which might have been expected to increase the yield of the fisheries.

Studies of the scup, squeteague, sea bass, and flounders have been designed to discover the size and age at which the greatest yield in

pounds can be taken at the lowest cost. These studies indicate that elimination of the present widespread practices of destroying fish below market size and of marketing fish that would be more valuable if allowed to grow to a larger size, offers the greatest promise of improving the condition of these fisheries. Sorting of the catches by pound nets, seines, and otter trawls, whenever possible, is urged.

Causes of the decline in abundance of the Atlantic coast shad, and measures for restoring the fishery, are being sought in an investigation which was initiated during the year. Because the Hudson River shad catch has staged a spectacular recovery under careful regulation from less than 100,000 pounds in 1917 to nearly 3,000,000 pounds in 1936, this area is being carefully studied to determine what conditions are responsible for the recovery. The fundamental question of the number of spawners necessary to maintain the fishery at a given level of abundance is being attacked by tagging spawning migrants and spent fish, studying scales, and deriving indices of abundance from catch data. The effectiveness of present methods of artificial propagation and the possibility of rearing fry to a greater size before liberation are also being investigated.

Widespread concern over the decline of the striped bass fishery in certain sections of the Atlantic coast during the years immediately preceding 1936 led the Division to undertake an investigation continuing and complementing work done by several of the States. Tagging experiments indicate that the fishery takes a heavy toll of the small sizes before they mature, and it is believed that restriction of the catch of these younger and smaller fish would increase the total yield and augment the number of spawners. Extensive seasonal migrations were also demonstrated by the tagging.

Shrimp investigations on the South Atlantic and Gulf coasts.—The problem of maintaining the present yield of the shrimp fishery without endangering future supplies was attacked by tagging experiments and the collection of catch records on both coasts and by exploratory trawling in the Gulf of Mexico to locate new supplies.

The discovery of large schools of shrimp in the deeper offshore areas of the Gulf, which was made by the vessel *Pelican* during the year, furnished proof of the theory long held by Bureau investigators that the shrimp congregate in deep water after they disappear from inshore fishing grounds in the fall and winter. Since it has been shown that some, at least, of these offshore aggregations are large enough to warrant commercial operations, it is believed that the strain on the immature shrimp inshore may be relieved by offshore fishing with beneficial results to the fishery. By taking more of the large shrimp and fewer of the small, immature stages, fishermen may take the same poundage, but fewer shrimp will be removed from the total available. Commercial fishermen began offshore operations in the early spring months as a result of the surveys by the *Pelican*.

The year's tagging operations resulted in the discovery that at least a portion of the shrimp from as far northward on the Atlantic coast as North Carolina migrate to Florida during the winter. From this fact it is clear that the South Atlantic shrimp fishery should be considered as a unit. The need of better protection of the young shrimp is strongly indicated by the fact that the total catch in this area remains at about the same level despite considerable increases in the number of boats and amount of gear.

North Pacific and Alaska fishery investigations.—Commercial fishery investigations in northern Pacific waters are concerned with recommending measures for the management and conservation of the salmon runs in the rivers of the Northwestern Coastal States and with maintaining at a productive level the salmon and herring fisheries of Alaska, over which the Federal Government has jurisdiction.

Rehabilitation of the Columbia River's $10,000,000 salmon industry is believed to depend in large measure upon the restoration of formerly productive spawning areas which are now unavailable or unsuitable. Approximately 2,500 miles of stream have been surveyed for the purpose of discovering additional spawning grounds that may be restored to use and of locating obstructions to upstream migrants and hazards to seaward migrating fingerlings, such as unscreened irrigation ditches. Data for 2,300 miles of stream which were tabulated during the winter showed a total of 418 dams, of which 288 are temporary and 104 are permanent. Five hundred ninety-five diversions were discovered, 563 of which are used for irrigation. On the basis of surveys covering north central, south central, and southeastern Washington, it is estimated that about 55 percent of the streams surveyed provide suitable spawning areas, but about half of this total is unavailable to fish at low water.

In Alaska, Government regulation of the commercial salmon catch is designed to allow a sufficient number of spawners to escape the fishery to maintain the runs of future years. The effectiveness of such regulations depends upon knowledge of the returns that may be expected from a given spawning escapement. Since past observations have established the fact that the ratio of spawning adults to returns several years later varies considerably, studies of the conditions which govern such fluctuations are of paramount importance. Continuing programs of research are therefore conducted on red salmon at Karluk River and on pink salmon at Little Port Walter in southeastern Alaska.

Additional evidence was secured during the year indicating that better returns are obtained from red salmon fingerlings that remain in fresh water until their third or fourth year than from those that migrate at an earlier age. It is therefore clear that the discovery of means to improve growth and survival of the young in fresh water will have a definite effect on the size of the runs. Major attention was given during the summers of 1937 and 1938 to an investigation of the effect of predatory Dolly Varden trout in reducing the numbers of young salmon. Little information being available about the migrations, growth rates, and age of this species, a series of marking experiments was carried out to supply such knowledge. Field observations throughout the spawning area showed that the heaviest toll is taken during the spring, at the time the young salmon are entering the lake from the spawning streams.

The long-term study of the pink salmon populations of southeastern Alaska deals chiefly with measuring the success of spawning in the streams each year, and with discovering the effect of various natural conditions on the survival of the young. Because the pink salmon, unlike the red, has a 2-year life cycle, the failure of 1 year's brood has serious effects on the fishery 2 years later. Continuous observations are therefore necessary in order to foresee such poor years and regu-

late the fisheries accordingly. These observations consist in counts of the spawning migrants so that the total egg production may be estimated, followed later in the season by counts of the migrating young. From these figures the fresh water mortality is computed. The total ocean mortality is determined by comparing the number of seaward migrants with the numbers returning 2 years later. Because the survival of eggs has been shown to be affected by the extreme seasonal variations in rainfall and temperature, a meteorological record has been kept during the year at the experimental stream at Little Port Walter to secure accurate data on weather conditions.

Studies of the coho salmon in Puget Sound are concerned with methods of rebuilding the runs which were formerly so important in this area. Studies have been carried on over a period of several years to determine the age at which hatchery reared fry may be released most advantageously. Results show conclusively that long periods of rearing bring much larger returns of adult fish. These studies are being continued and exact costs of rearing and handling are being computed.

The extensive tagging work of previous years of the Alaska herring was continued, with the result that the migratory habits of practically every commercially important population has been established. The electronic tag detector was again operated successfully for the recovery of tagged fish.

Herring in the Cape Ommaney area, from which the bulk of the catch in southeastern Alaska is made, have shown a marked decline in abundance during recent years. This decline is the result of a combination of factors—intensive fishing, migrations, and failure of spawning in 1932, 1933, and 1934. Continued observations on each of these conditions being essential to proper management of the fishery, tagging studies were supplemented by the collection of catch statistics and data on the size and age composition of the catch.

Pacific pilchard investigations.—The phenomenal increase in the landings of the Pacific pilchard fishery to a level three times as great as the total landings of all other kinds of fish in the Pacific Coast States has given rise to public concern over the ability of the resource to provide catches of this size without undergoing depletion. In response to this demand, the Bureau of Fisheries was provided with funds by Congress at the beginning of the fiscal year to investigate the condition of the resource.

Major attention is being given to the question of determining the intensity of fishing which will provide the maximum yield of fish of greatest commercial value, and, at the same time, leave an adequate spawning stock. Since accurate methods of determining age and estimating abundance are fundamental to the solution of these problems, the early months of the investigation have been devoted chiefly to developing a satisfactory technique of age determination and a method of estimating abundance from catch statistics or by aerial observation of schools. Preservation of an adequate spawning reserve, however, depends on an annual census of egg production which cannot be undertaken without a seagoing vessel.

Great Lakes fisheries investigations.—Because of the severe depletion of the Great Lakes fisheries, now generally recognized, problems of fishery research in this area are concerned chiefly with obtaining

an accurate measure of the abundance of certain species, studying the effect of various types of gear in commercial use, and supplying technical advice to aid State officials in the framing of commercial fisheries regulations.

An investigation was conducted on Lake Erie to determine the relation between the mesh size of gill nets and both the volume of the catch and the size of individual fish taken. On the basis of these and earlier gill-net studies, the Bureau will recommend a definite mesh size for gill nets used for all species commonly taken in small-meshed nets, and will recommend also an upward revision of present legal size limits for blue pike-perch and saugers in order to provide better protection for spawning females.

Because of the legal provision that net mesh must measure full size at all times, an investigation was carried out to determine the allowance that should be made for shrinkage. The differences among various methods of measuring gill-net meshes are also being determined experimentally. These two investigations will provide for more effective operation of the fundamental conservation measure of net regulation.

During the year a survey was made to determine the effect of commercial fishing on the game fishes of the Potasannissing Bay area. The findings will be made the basis of recommendations for the regulation of the fisheries.

Progress was made in compiling and analyzing the extensive collections of data from earlier years. These included a complete analysis of statistics of commercial fisheries of Great Lakes waters under jurisdiction of the State of Michigan, providing records of fluctuations in fishing intensity, yield, and abundance of important commercial species over an 8-year period; a study of the whitefish fisheries of Lake Michigan and Lake Huron; and a comprehensive report on the investigation of Lake Champlain fisheries conducted by the international fact-finding commission in 1930 and 1931.

Life history studies of the yellow perch and Lake Erie whitefish were resumed and studies of the competitive food habits of lake trout and lawyers were completed, the conclusion being reached that both species are predators of the commercially important whitefish family, and that the lawyer through its consumption of invertebrates is also a food competitor of the whitefish.

Important advances made during the year in State administration of the fisheries were the adoption of the flexible rule method of measuring gill-net meshes by four Great Lakes States and the Province of Ontario, and the passage of a discretionary power act by the Wisconsin Legislature, empowering State conservation officials to enact commercial fisheries regulations by decree.

AQUICULTURAL INVESTIGATIONS

Although the yearly output of fresh-water game fishes by State and Federal hatcheries amounts to several billion young fish, it is generally recognized that a commensurate return is not being realized by the several million anglers who seek sport in the Nation's streams. The conclusion is inescapable that some, at least, of the hatchery output is being wasted by being planted under conditions which do not favor survival. Scientific investigations being conducted in the field of

aquiculture are directly concerned with the reduction of this waste by determining at what age and under what conditions fish should be planted to insure maximum returns. Improvement of hatchery practices in feeding and selective breeding and the reduction of loss through disease are also under investigation.

Fish management practices which have been developed by many years' experimentation are being tested in various national forest areas throughout the country, which serve as excellent natural laboratories for this purpose. In the Pisgah National Forest project, operated in cooperation with the Forest Service, studies were carried out during the year to determine what size of fish and what intensity of stocking produce most satisfactory results. The effects of various stream improvements on the production of fish and food organisms are also the subject of studies which will find widespread application.

In California, experiments of an essentially similar nature were carried out during the summers of 1937 and 1938 in the Convict Creek Experimental Stream. The survival rates of various species, sizes, and numbers of trout were compared as a guide for stocking programs. Among the results obtained was the finding that hatchery fish of 2 inches or more show a surprisingly high survival in wild waters, and that there is a distinct species difference in ability to make adjustments to new conditions after planting.

The continued operation of test waters in Vermont shows conclusively that stocking alone is not enough to maintain the supply in the waters under observation, for, while the species stocked (brook trout) has shown a consistent decline, the rainbow trout, which is dependent on natural propagation, has held its own.

Fundamental studies in the science of fish nutrition have been continued at Cortland, N. Y. Two lines of attack were made on the problems presented. The first was concerned with improving current hatchery practices by introducing new foodstuffs that are readily available, and by improving the quality of the mixtures in current use. In this connection a process has been developed for freeing linseed meal of its toxic properties by steaming and pressure cooking, while retaining its important property of binding water or meat juices. Progress has been made toward keeping meats for long periods without loss of nutritive value or physical properties, a development which would decrease the labor and investment in refrigeration equipment and make it possible to purchase meat in quantity at periods of low prices.

Field studies in bass streams are concerned with much the same problems as trout studies in colder waters. Studies in selected waters of natural spawning, survival of the young, their food habits and growth, lead to the tentative conclusion that, in the case of bass, natural propagation is more efficient than artificial, and suggest that management practices should be directed chiefly to the improvement of natural conditions.

Experimental studies of fish diseases were continued. The value of routine preventive treatments is being tested, and records are being carefully kept of possible mortality from such treatments. No increase in mortality was found among fingerling trout. Controlled infection studies were also conducted with the object of learning more about the method of transmission of certain diseases in hatcheries.

The Disease Service continued to assist in the diagnosis of hatchery disease by examining preserved specimens sent to the Seattle and Washington laboratories. This service is extended to Federal, State, and private fish culturists.

POLLUTION INVESTIGATIONS

Every State and every major river system have now been included in the stream-pollution studies conducted from headquarters at Columbia, Mo. Over 150 new localities were investigated during the year and observations were continued at approximately 70 old stations. Data collected from these field and laboratory studies are being applied to the solution of practical fisheries problems. Forty-three major cases of stream pollution were investigated by the staff during the year and reports were prepared for the guidance of officials concerned. In addition, the staff has aided in the solution of some 200 lesser problems. Many manufacturers have cooperated to a gratifying degree in applying the findings of the staff.

Detailed surveys were made of several artificial impoundments of water, and practical applications of these studies have been made in connection with the stocking programs of various Western streams on which impoundments have been built or are contemplated.

SHELLFISH INVESTIGATIONS

Oysters continue to hold second place in value among all fishery products. The industry is troubled, however, by the increasing depletion of the natural beds, the destruction of valuable bottoms by pollution, and the losses caused by natural enemies.

In the New England area the principal problems are those of obtaining an adequate set of larval oysters and of protecting the beds from starfish. Information on the expected time of spawning and setting was distributed at weekly intervals during both the 1937 and 1938 seasons through the cooperation of the Connecticut Shellfisheries Commission. This information was based on systematic observations of water temperatures and the condition of oysters at selected points in Long Island Sound. It is hoped to extend this service to other areas in the near future.

The destruction of most of the early season set of oysters in 1937 by starfish demonstrates the importance of studies for their control which were carried on intensively from the Milford, Conn., laboratory during the winter and spring. A chemical method of control was applied under both field and laboratory conditions and its effectiveness in destroying starfish was established. Careful tests have revealed no injury to oysters.

Ecological observations were made by the staff during the year at other points on Long Island Sound and in the inshore waters of Virginia, North Carolina, Alabama, and Florida. These observations have guided State authorities and private oyster growers in transplanting seed and planting material for the collection of set. Plans were also prepared for the rehabilitation of several depleted areas.

Studies under way from the new marine laboratory at Pensacola, Fla., include surveys of the condition of local oyster beds and the collection of hydrographic data and plankton samples at selected points.

A preliminary report was published during the year setting forth the causes of the decline in oyster production which has been strikingly evident in the York River, Va. Field and laboratory studies have demonstrated that the effluent from a local pulp mill is toxic to oysters and that its discharge into the York River is primarily responsible for unfavorable conditions in this area. Further chemical studies of the effluent are being continued to determine which of its constituents are most toxic.

LAW ENFORCEMENT DIVISION

This Division is concerned with the enforcement of the act of 1931, regulating interstate commerce in black bass, and work incident to the Whaling Treaty Act of May 1, 1936, to give effect to whaling treaties. This Division also conducts an anglers' service, and issues permits for the taking of bait fish in the District of Columbia.

The black bass law.—There has been no change in the manner of administering the Federal black bass law since last year. In cooperation with the States, approximately 100 investigations have been made of alleged illegal shipments of black bass, many of which have resulted in obtaining evidence on which prosecutions can be based in either Federal or State courts. In many cases seizures of black bass were made, and objectives obtained without recourse to court procedure.

In connection with the administration of the black bass law, the Division assists the States in the improvement of their angling laws, and in bettering black bass conditions in other ways. The Bureau has received excellent cooperation from the States in this work. The usual publications on fish laws, angling, etc., have been renewed and distributed, to supply an increasing demand.

Whaling.—A total of 25 licenses to take and process whales were issued by the Secretary of Commerce to 2 floating factory ships, 1 shore station, and 22 catcher boats which are operated from the factory ships and shore stations. The total revenue received from these licenses was $7,000, which was turned over to the United States Treasury. One scientific permit was issued to import a Right Whale for scientific purposes.

The enforcement of the whaling laws is primarily the duty of the Coast Guard and the Bureau of Customs, with which the Bureau of Fisheries cooperates.

The Department is charged in the Whaling Treaty Act with the collection of statistical and biological whaling data in addition to the issuance of licenses. The Division has prepared two statistical reports covering the number of whales taken, species, sex, size, etc., which have been forwarded to the Association of Whaling Companies, Sandefjord, Norway, as required by treaty, and has completed biological examinations of a large number of samples of whale stomach contents from whales captured by United States whalers.

Angling.—A large part of the time of the Division is taken up in answering questions relative to how, when, and where to fish. Complete information on fishing tackle, fishing laws, etc., has been assembled in the Division for the use of anglers.

VESSELS

Fifteen vessels of the Alaska service cruised about 115,000 nautical miles in the fiscal year 1938, as compared with 131,000 miles in the preceding year. The *Penguin* covered approximately 30,000 miles, the *Brant* about 12,000 miles, and the *Crane*, *Scoter*, and *Teal* each about 10,000 miles.

The *Penguin* made five round trips between Seattle and the Pribilof Islands, transporting personnel and emergency supplies. Interisland service was performed, and native workmen from the Alaska Peninsula were transported to the Pribilof Islands to assist with the sealing activities. Two trips were made to the western Aleutians, one in July and one in September, in connection with the sea-otter patrol.

The *Auklet*, *Kittiwake*, *Merganser*, *Murre*, and *Widgeon* were engaged in fishery protective work in southeast Alaska during the 1937 season. The *Blue Wing* operated on Prince William Sound, the *Eider* in the Kodiak area, the *Ibis* at Chignik, the *Red Wing* in the Alaska Peninsula area, and the *Coot* on the Yukon River. The *Crane* transported personnel and supplies between Seattle and Bristol Bay in May and August and patrolled the Alaska Peninsula area during the intervening period.

The *Scoter* was used on Bristol Bay during the fishing season there and then participated in the patrol of the Alaska Peninsula area for a short time. From about the middle of August to the middle of September it was engaged in the patrol and stream-survey work in the Kodiak area; similar duty was performed later in the vicinity of Craig in southeast Alaska. The *Teal* was engaged in herring tagging operations in southeast Alaska in the spring, after which it carried on the patrol in Cook Inlet from May to August and on Prince William Sound for a few weeks in September.

The *Brant* was used primarily for general supervisory work, chiefly in southeast Alaska, although one cruise was made as far westward as Dutch Harbor in July.

In the spring of 1938 the *Scoter* assisted with the fur-seal patrol in the vicinity of Neah Bay, Wash.

The *Pelican*, which was reconditioned during the previous year for use in shrimp investigations in the South Atlantic and Gulf areas, was engaged in exploratory trawling in offshore waters in the Gulf of Mexico during the greater part of the winter and spring.

APPROPRIATIONS

Appropriations for the Bureau for the fiscal year aggregated $1,967,000, as follows:

Salaries, Commissioner's office	$150,400
Propagation of food fishes (including $260,000 for construction)	929,000
Maintenance of vessels	168,000
Inquiry respecting food fishes	262,000
Fishery industries	73,600
Fishery market news service	75,000
Alaska fisheries service	274,000
Enforcement of black bass law	13,500
Mississippi Wild Life and Fish Refuge	17,900
Whaling Treaty Act	3,600
	1,967,000

U. S. GOVERNMENT PRINTING OFFICE: 1939

U. S. DEPARTMENT OF COMMERCE
DANIEL C. ROPER, Secretary
BUREAU OF FISHERIES
FRANK T. BELL, Commissioner

Administrative Report No. 30

PROGRESS IN BIOLOGICAL INQUIRIES 1937

By ELMER HIGGINS

APPENDIX I TO REPORT OF COMMISSIONER OF FISHERIES
FOR THE FISCAL YEAR 1938

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ADMINISTRATIVE REPORT SERIES

Since the beginning of the Administrative Report Series, considerable confusion has arisen concerning the system of numbering the separates composing it. Inasmuch as the Reports of the Divisions vary in order from year to year, many have found their designations as "Appendix No. I, II, III, or IV" very confusing. To relieve this, it has been decided to number them as "Administrative Report No. —." Inasmuch as 20 separates had already been printed in this series before starting the numbers, it was deemed advisable to begin the numbering with Administrative Report No. 21. Of course, numbers cannot be printed on those already off the press, but for the information of those who wish to know what the first 25 were, they are numbered for filing purposes as follows:

No. 1. Report, Commissioner of Fisheries, 1931.
No. 2. Alaska Fishery and Fur-Seal Industries, 1930.
No. 3. Fishery Industries of the United States, 1930.
No. 4. Progress in Biological Inquiries, 1930.
No. 5. Propagation and Distribution of Food Fishes, 1931.
No. 6. Report, Commissioner of Fisheries, 1932.
No. 7. Alaska Fishery and Fur-Seal Industries, 1931.
No. 8. Fishery Industries of the United States, 1931.
No. 9. Progress in Biological Inquiries, 1931.
No. 10. Propagation and Distribution of Food Fishes, 1932.
No. 11. Alaska Fishery and Fur-Seal Industries, 1932.
No. 12. Progress in Biological Inquiries, 1932.
No. 13. Fishery Industries of the United States, 1932.
No. 14. Propagation and Distribution of Food Fishes, 1933.
No. 15. Fishery Industries of the United States, 1933.
No. 16. Alaska Fishery and Fur-Seal Inquiries, 1933.
No. 17. Progress in Biological Inquiries, 1933.
No. 18. Propagation and Distribution of Food Fishes, 1934.
No. 19. Alaska Fishery and Fur-Seal Industries, 1934.
No. 20. Fishery Industries of the United States, 1934.
No. 21. Progress in Biological Inquiries, 1934.
No. 22. Propagation and Distribution of Food Fishes, 1935.
No. 23. Alaska Fishery and Fur-Seal Industries, 1935.
No. 24. Fishery Industries of the United States, 1935.
No. 25. Propagation and Distribution of Food Fishes, 1936.

Note that the last Commissioner's Report was for 1932. Since then its place has been taken by a reprint from the Report of the Secretary of Commerce under the title "Bureau of Fisheries." Inasmuch as it is no longer a Bureau publication, it is not numbered; but it will be supplied to any who request the Report of the Commissioner for any year since 1932.

PROGRESS IN BIOLOGICAL INQUIRIES, 1937 [1]

By ELMER HIGGINS, *Chief, Division of Scientific Inquiry*

[With the collaboration of investigators]

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INTRODUCTION

To an ever-increasing degree, efforts in the field of fishery science are bringing the resources of the waters under a measure of human control. Particularly is this true of the important shellfish supplies

[1] Administrative Report No. 30, Appendix I to Report of the U. S. Commissioner of Fisheries for 1938
Approved for publication June 4, 1938.

of the Atlantic, Gulf, and Pacific coasts and of the stocks of game and commercial fishes in the interior waters. Principles of fish management developed by scientific research have been applied with conspicuous success to these fisheries. The application of similar management practices to the great marine fisheries is relatively a virgin field, but one in which encouraging progress is being made.

As a basis for effective fish husbandry, direct and continuing observations of the fisheries themselves are essential. In addition, fundamental problems of fishery conservation are often solved only with the aid of highly technical laboratory research. Both types of studies are necessarily carried on over long periods of time, and progress reported in any particular year must be interpreted in relation to the whole program of investigations of which it forms a part. Nevertheless outstanding trends and developments in the commercial fisheries during the year 1937, as well as important achievements in the biological investigations conducted by the Division of Scientific Inquiry, may well be summarized at this time.

Commercial Fisheries.—In the North Atlantic area notable developments occurred in both the mackerel and haddock fisheries. The spectacular decline of the mackerel catch to a level which was only about one-third of the previous year's yield was an event of economic and biological consequence, resulting in a sharp increase in price per pound, but in a greatly reduced total return. This decline, of unforeseen magnitude, is believed to be the result of oceanographic conditions at present not understood, which prevented the mackerel from congregating in the usual fishing areas. The year continued the downward trend in haddock landings begun in 1931. Of even greater significance is the fact that it was the first year of simultaneous decline in abundance (as measured in terms of catch per trawler per day) on the Georges and Nova Scotian banks. Declining abundance on Georges Bank drove the greater part of the otter trawl fleet to the distant Nova Scotian banks in 1934, giving the former area an opportunity for moderate recovery. By 1936, however, the catch per day on the Nova Scotian banks began to decline and a return to Georges Bank followed, again increasing the strain on the inshore banks. As a result of these shifts, both major haddock areas are now in a state of declining abundance. The developments in these two fisheries emphasize the need for continuation and extension of the biological studies that have been prosecuted by the Division in this area. It is the purpose of these studies to provide knowledge of the limits of safe exploitation by the haddock fishery and to establish a sound basis for prediction of fluctuations in mackerel abundance.

A program of studies designed to direct the rehabilitation of the seriously depleted shad fishery was initiated during the year in the Middle and South Atlantic area. Headquarters for the fishery investigations of this entire section have been transferred from Massachusetts to a more centralized location at College Park, Md., and a field laboratory has been established at Charleston, S. C. A survey of Long Island fisheries by the Bureau staff in cooperation with the New York Conservation Department has been launched to provide information on the relative intensity of the commercial and the growing sports fisheries of this region. A flounder tagging program carried out by the Bureau in cooperation with the State of Rhode Island has already demonstrated that the catch by sportsmen in many cases

forms a significant proportion of the total poundage taken. Continued studies of scup, squeteague, and other fishes which migrate widely along the Atlantic coast, as well as of such anadromous species as shad and striped bass, are expected to provide basic knowledge for the application of fishery management practices which are critically needed in this area.

In the shrimp fishery of the South Atlantic coast the picture is one of continued increase in number of boats and amount of gear fished and of a catch which fails to increase in spite of augmented fishing effort. Fishing operations are consequently growing less profitable and the need of better protection for the young shrimp is clearly indicated. The tagging program, continued through 1937, gave additional information on the coastwise movements of shrimp and demonstrated that protection of the supply is an interstate problem. Investigations on both South Atlantic and Gulf coasts were pursued jointly with the conservation departments of several southern states for the purpose of devising a system of rational management for the fishery.

To provide a continuous fund of information for their proper regulation, studies of the salmon fisheries of Alaska were continued without interruption or material change. In the Karluk area, where effort is being concentrated on the causes of fresh water mortality among young red salmon, marked progress was made in studies of predatory species. Further light on the factors which affect the returns from escapements of pink salmon was gained, and tagging experiments on sockeye, coho, and chinook salmon were continued in the Puget Sound area and on the Columbia River. Progress may also be reported on the investigation of the entire Columbia River Basin to determine what protective and restorative measures are necessary for the protection of the salmon runs of that river. Approximately 2,300 miles of stream have now been surveyed in the Columbia watershed for the purpose of discovering additional spawning grounds that may be restored for use by salmon and of locating obstructions to migrating fish and hazards to downstream migrants in the form of unscreened irrigation ditches.

During the latter part of the year headquarters were established in California for the investigation of the pilchard fishery. Greatly increased exploitation of the Pacific sardine or pilchard within recent years has given rise to fears for the safety of the resource. The investigation is planned to determine whether overfishing exists and to prescribe proper measures for regulation of the fishery, should regulation be found necessary.

Important advances in State administration of the fisheries have been made during the year in the Great Lakes area with the adoption of the flexible rule method of measuring gill net meshes by Wisconsin, Illinois, Michigan, and Ohio, and the passage of a discretionary power act by the Wisconsin legislature, giving wider legislative powers to State conservation officials. Continuing its cooperation with State officials and the fishing industry, the Great Lakes staff has acted in a fact-finding and advisory capacity in several important conservation problems during the year. Life history studies of important commercial species have been continued and statistical analyses of commercial fishing records have provided additional evidence of the severe depletion existing in the Great Lakes fisheries.

Shellfisheries.—Oyster investigations during the year added to the physiological and ecological knowledge on which successful oyster culture is based. In the New England section there was inaugurated the important service of predicting the time and relative intensity of spawning and setting, thus enabling growers to plant their shells at the proper time to obtain the maximum set of larval oysters. Studies on the starfish demonstrated clearly that the control of this destructive enemy of the oyster is an interstate problem and that more effective and better coordinated measures must be taken for its eradication. Experiments looking toward chemical control of starfish have progressed to such a point that their practical application during 1938 seems assured. Additional evidence has been secured of the detrimental effect of pulp-mill effluent on shellfish. Studies of the precise nature and physiological effect of the effluent will be of great assistance in any efforts that may be made to remedy this pollution hazard. Ecological surveys made by the staff in Long Island Sound, Virginia, North Carolina, Alabama, and Florida have been used by State conservation authorities for the protection and improvement of shellfish resources of the coast. During the year a new laboratory was established at Pensacola, Fla., to serve as headquarters for oyster investigations of the Gulf area.

Fresh water fisheries.—In recognition of the critical need for a broader basis of scientific fact to direct the rapidly expanding fish cultural operations throughout the country, investigations of the aquicultural staff have been directed in particular toward the development of new and more effective methods, both in the rearing and stocking of fish. The continued operation of test streams in Vermont has demonstrated the value of this procedure as a yardstick for measuring the success of stocking in trout waters. The Pisgah National Forest in which an experimental project has now been under way for more than a year provides an excellent natural laboratory for the application and testing of fish management practices. Here studies are under way to determine the size of fish and the intensity of stocking which produce most satisfactory results and to test the effect of various types of stream improvement on the production of fish and food organisms. Through the operation of experimental streams in California, data are being collected on the survival rates of hatchery trout planted at various ages and under varying predator conditions. The accumulation of such information over a period of years will serve as a definite guide for stocking programs.

In the fundamental nutrition studies which have been continued at Cortland, N. Y., current hatchery feeding practices are being improved through the testing of a great variety of products. Through biochemical and physiological studies, an attack has been made on the important problem of so adjusting the growth rate of hatchery fish that the most desirable physical development will be produced.

Because fish management practices as applied to bass have received little attention from fish culturists in general, fundamental problems in this field remain unsolved. Determination of the effectiveness of natural propagation, which in the case of bass may prove to be more efficient than artificial propagation, is obviously a first consideration. Observations on the time of spawning, the production of fry, and the food and growth of the young bass have therefore been conducted

during the year in selected waters. Continuation of these studies gives promise of yielding results of great practical importance by indicating whether the efforts of fish culturists may more profitably be spent on artificial propagation or on the improvement of natural conditions in bass waters.

At the Quilcene, Wash., hatchery, both preventive and therapeutic measures for combating common hatchery diseases were investigated under controlled conditions. The superiority of this experimental approach to the problem of hatchery disease has already been clearly demonstrated during the comparatively short time the laboratory has been in operation.

Every State and every major river system have now been included in the stream pollution studies conducted from headquarters at Columbia, Mo. Data so gathered have been applied to the solution of numerous fisheries problems, and applications of these findings are being made by manufacturers for the correction of pollution hazards with increasing and encouraging frequency. Physiological experiments to determine the cumulative effect of substances naturally present in many waters in minute quantities have yielded results of great significance. In cooperation with the National Research Council, investigations of the fisheries problems in several of the larger impoundments of water in the western part of the country have been initiated. Results of these studies, as yet incomplete, are already finding practical application in connection with stocking programs.

COOPERATION

As in previous years, the Bureau again gratefully acknowledges extensive cooperation in the conduct of biological investigations of the fisheries which, during the past year, has extended and rounded out materially the program of work. This cooperation includes active participation in research projects by the personnel of the Bureau of Fisheries and other agencies, the furnishing of laboratory and office quarters, equipment, boats, personnel, and other facilities and services, and, in some cases, the donation of funds to joint projects. Such cooperation has been afforded by universities, research institutions, agencies of the State governments, such as fish and game commissions and surveys, and various Federal agencies concerned with the management of natural resources with collateral interests in fisheries.

Several of the sections of the Division of Scientific Inquiry are afforded headquarters for their regional activities by the universities where laboratory and library facilities are unexcelled. Cooperation from the States has consisted generally in the furnishing of office and laboratory headquarters, the provision of boats and assisting personnel, and in some cases the active participation in investigative programs with a joint staff of Federal and State employees. In one instance a brief investigation was undertaken entirely on funds provided by a commercial fishery organization.

Cooperation with Federal agencies has shown continued improvement during the past year. A cooperative program with the Forest Service is continuing upon a mutually satisfactory basis and similar cooperation has been effected with the Tennessee Valley Authority.

The Reclamation Service with the assistance of the Bureau is undertaking increased activities in protecting fisheries from irrigation projects. The Federal Power Commission is supporting the Bureau's efforts to provide suitable fish protection on all projects constructed under license from that agency in accordance with law. The Bureau has been able also to extend its cooperation with the Indian Service in the development and protection of the fishery resources on reservations. Through the work of the National Resources Committee and the Council of State Governments, both of which agencies have called upon the Bureau for assistance, additional attention is being given to the development of coordinated programs of fishery conservation throughout the country demonstrating again the opportunities for effectively integrating all of the activities of government at various levels in this field.

Specific acknowledgment of cooperation afforded by the various agencies is generally included in each of the succeeding sections of this report.

PUBLICATIONS

Owing to the curtailment of funds for printing, the number of publications resulting from investigations of the staff has been reduced. The list of papers published by the Bureau during 1937 follows:

GALTSOFF, PAUL S., H. F. PRYTHERCH and J. B. ENGLE.
Natural history and methods of controlling the common oyster drills (*Urosalpinx cinerea* Say and *Eupleura caudata* Say). Fishery Circular No. 25, 24 pp., 13 figs.

HIGGINS, ELMER.
Progress in Biological Inquiries, 1936. Administrative Report No. 29, 61 pp.

HILDERBRAND, SAMUEL F., and LOUELLA E. CABLE.
Further notes on the development and life history of some teleosts at Beaufort, N. C. Bulletin No. 24, 137 pp., 159 figs.

HOPKINS, A. E.
Experimental observations on spawning, larval development, and setting in the Olympia oyster, *Ostrea lurida*. Bulletin No. 23, 64 pp., 41 figs.

The following papers were published by members of the staff of the Division of Scientific Inquiry during the year 1937, outside of the Bureau of Fisheries series:

DAVIDSON, FREDERICK A.
Migration and homing of Pacific salmon. Science, vol. 86, No. 2220, pp. 55–56.

ELLIS, M. M.
Pollution and aquatic life. Proceedings, Second North American Wildlife Conference, pp. 653–658.

ELLIS, M. M., H. L. MOTLEY, M. D. ELLIS, and R. O. JONES.
Selenium poisoning in fish. Proceedings of the Society for Experimental Biology and Medicine, vol. 36, pp. 519–522.

ELLIS, M. M., H. L. MOTLEY, and M. D. ELLIS.
Sore throats from exposure to selenium. Journal, American Medical Association, vol. 109, pp. 1717–1718.

FIRTH, FRANK E.
Recent records extending the range of *Caulolatilus microps* north of Florida. Copeia, No. 3 (1937), p. 189.

FIRTH, FRANK E., and E. W. GUDGER.
Two reversed partially ambicolorate halibuts: *Hippoglossus hippoglossus*. American Museum Novitates, No. 925.

GALTSOFF, PAUL S.
General methods of collecting, maintaining, and rearing marine invertebrates in the laboratory. Culture Methods for Invertebrate Animals. Comstock Publishing Co., pp. 3–36.
Hatching and rearing larvae of the American lobster. Ibid., pp. 233–236.
Spawning and fertilization of the oyster, *Ostrea virginica*. Ibid., pp. 537–538.
Observations and experiments on sex change in the adult American oyster, *Ostrea virginica*. Collecting Net, vol. 12, No. 8, pp. 187–188; and Biological Bulletin, vol. LXXIII, p. 356.
A story of the first zoologist in Alaska. Review of Dr. Leonhard Stejneger's book, "Georg Wilhelm Steller." Collecting Net, vol. 12, pp. 64–65.

GALTSOFF, PAUL S., H. F. PRYTHERCH, and J. B. ENGLE.
Controlling the common oyster drill. Western Fisheries, vol. 15, pp. 12–15.

GINSBURG, ISAAC.
Review of the seahorses (Hippocampus) found on the coasts of the American continents and of Europe. Proceedings, U. S. National Museum, vol. 83, pp. 497–594.
The species and its subdivision. Copeia, No. 3 (1937), pp. 184–188.

HILDEBRAND, SAMUEL F.
The tarpon in the Panama Canal. Scientific Monthly, vol. 44, March, pp. 239–248, 4 figs.

HILE, RALPH.
Morphometry of the cisco, *Leucichthys artedi* (Le Sueur), in the lakes of the Northeastern Highlands, Wisconsin. Internationale Revue der gesamten Hydrobiologie und Hydrographie, Band 36, Heft ½, s. 57–130.

KELEZ, GEORGE B.
Hook and line catches in Puget Sound. Fishing Directory of Western Washington, E. Bauer, Seattle, Wash.

LOOSANOFF, V. L.
Development of the primary gonad and sexual phases in *Venus mercenaria* Linnaeus. Biological Bulletin, LXXII, June, pp. 389–405.
Oyster pest control studies in Long Island Sound. State of Conn. Biennial Report of Shellfish Commissioners, 1935–36. Doc. No. 30: pp. 10–14.
Seasonal gonadal changes of adult clams, *Venus mercenaria*. Biological Bulletin, LXXII, June, pp. 406–416.
Spawning of *Venus mercenaria*. Ecology, vol. 18, No. 4. October, 506–515.
The spawning run of the Pacific surf smelt, *Hypomesus pretiosus* (Girard). International Revue der gesamten Hydrobiologie und Hydrographie, Band 36, S. 170–183. Akademische Verlagsgesellschaft m. b. H., Leipzig.
Spermatogenesis in the hard shell clam, *Venus mercenaria* Linnaeus. Yale Journal of Biology and Medicine, vol. 9; May, pp. 437–442.
Use of Nile Blue Sulphate in marking starfish, Science, vol. 85, No. 2208, p. 412.

MEEHEAN, LLOYD.
Additional notes on *Argulus trilineatus* (Wilson). Ohio Journal of Science, vol. 37, No. 5, pp. 288–292.
The relative importance of plankton constituents in bass ponds as measured by the organic content. International Revue der gesamtem Hydrobiologie und Hydrographie, Band 36, S. 131–137.

NEEDHAM, P. R.
Methods of measuring anglers' catches in inland waters. Copeia, No. 1 (1937), pp. 41–48.
Notes on the introduction of *Salmo nelsoni* Evermann into California from Mexico. Transactions of the American Fisheries Society, vol. 67. In press.

NESBIT, ROBERT A.
Some results of trout tagging in Massachusetts. Copeia, No. 3 (1937), pp. 168–172.

VAN OOSTEN, JOHN.
First records of the smelt, *Osmerus mordax*, in Lake Erie. Copeia, No. 1 (1937), pp. 64–65.
Doom of the Great Lakes fisheries. American Forests, vol. 43, No. 3, pp. 103–105, 144–145.
The artificial propagation of the commercial species of fish of the Great Lakes. Proceedings, Second North American Wildlife Conference, pp. 605–612.

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MISCELLANEOUS PUBLICATIONS

The following publications were issued by the Division of Scientific Inquiry or prepared with its cooperation:

U. S. Bureau of Fisheries.

The Progressive Fish Culturist. Memorandum I–131, 9 issues.

Fishes of the Great Lakes. Memorandum I–134D.

Migratory fish of the Atlantic and Gulf coasts. Special memorandum No. 3239. (With Division of Fishery Industries.)

Senate Document No. 87.

Bonneville Dam and the protection of the Columbia River fisheries. A report of the Commissioner of Fisheries transmitting, in response to Senate Resolution No. 113, a survey of the facilities for the passage of salmon at Bonneville on the Columbia River with recommendations for the conservation and the preservation of the fishing industry. July 22, 79 pp.

Progress reports of the investigations conducted by the various sections, prepared in the main by the section heads, are given in the following pages.

NORTH ATLANTIC FISHERY INVESTIGATIONS

William C. Herrington, *in charge*

In many respects 1937 was a disappointing year in the New England vessel fisheries. After a steady increase since 1932 in both quantity and value of catch, 1937 witnessed a decline of 6 percent in catch and 12 percent in value below the previous year. The decline in catch is particularly noteworthy, occurring as it did in spite of the increase in size of the fishing fleet through the addition of 10 large otter trawlers and several smaller vessels. The decrease in value per pound also is worthy of comment in view of the fact that meat prices during the same period were at their highest in many years.

Although the catch of several species, notably cod and flounders, increased, this gain was more than counterbalanced by declines in the catch of mackerel, whiting, redfish (rosefish), haddock, and pollock. The decrease in whiting and redfish possibly was a reaction from the meteoric expansion of these fisheries during the previous year, but the drop in mackerel and haddock was due to other than economic causes.

The most outstanding event both economically and biologically was the relative failure of the mackerel fishery. The 1937 catch reached but 14 or 15 million pounds, a decline of about 65 percent below the catch of the previous year. This scarcity was reflected in the price which increased from an average of 2.8 cents a pound in 1936 to 5.1 cents a pound in 1937 (Boston, Gloucester, and Portland landings). All other species decreased sharply in value except redfish which showed a slight increase.

In spite of the increased fishing capacity of the groundfish fleet from the construction of new boats, the haddock catch continued the decline begun in 1936. Preliminary calculations indicate that this decrease was due to a decline in catch per unit of effort of about 20 percent on Georges Bank and 26 percent on the Nova Scotian banks. This is the first decline on the former since 1933, and the third consecutive year of decrease on the latter. The total catch declined 5 percent from the 1936 total of 144,000,000 pounds.

General adoption of the Bureau's recommendation of large-meshed or "savings" gear for otter trawls took place in the spring of 1937 as the result of a voluntary agreement among the operators of New England otter trawlers. Owing to the lack of personnel, it has not been possible to make further observations on the use and performance of this gear, but reports indicate favorable results when properly used.

As during 1936, biological investigation was confined primarily to haddock and mackerel, while many other important species could not be covered owing to limited personnel and facilities. Among these were cod, second in importance only to haddock in the New England fisheries; redfish, flounders, pollock, and whiting. Additional knowledge of the yield and life history of all of these species is needed, for they are being subjected to increasingly intensive exploitation.

The exploratory shrimp trawling carried on in the Gulf of Maine in 1936 (described in Memorandum I–57) has not yet resulted in the development of a commercial fishery of any size. Occasional reports indicate growing interest in this resource which may eventually lead to the development of a considerable small boat fishery during certain seasons of the year.

Works Progress Administration Project No. 165–14–6999, begun in 1936, was terminated in July 1937. When the project came to an end, the mackerel and shorefish work was about completed, but considerable work remained on certain parts of the haddock project and on the compilation and charting of the data assembled on the project covering statistics of the New England fisheries.

The headquarters of the North Atlantic Fishery Investigations has remained in Cambridge and Boston, Mass. Harvard University has generously provided the staff with space and facilities in its Biological Laboratories. The cooperation of the Woods Hole Oceanographic Institution is gratefully acknowledged, as is the personal advice and interest of Prof. Henry B. Bigelow. The assistance and cooperation of fishermen and dealers in providing the use of their records, and in other ways, is also acknowledged with pleasure.

HADDOCK

The year 1937 witnessed no striking new developments in the New England haddock fishery although several trends indicated in earlier years became more pronounced. The increase in the otter-trawl fleet begun in 1936, continued with the addition of 10 large otter trawlers. These additions were partly counterbalanced by the withdrawal from active service of several old steam trawlers, but the total fishing capacity of the fleet was greater than at any other period in its history. In spite of this increased fishing effort, the total groundfish catch landed at Boston, Gloucester, and Portland by vessels of 5 net tons or over dropped about 2 percent from the all-time high of 386,000,000 pounds reached in 1936, and the catch of haddock, as noted above, decreased 5 percent from the 1936 total of 144,000,000 pounds. This decrease in haddock landings also was accompanied by a decrease in average value to the fishermen from 3.1 to 2.8 cents a pound with the result that the total value of the haddock catch dropped about 14 percent below that of the previous year.

The past year also showed a continuation of the trend toward a broadened base for the otter trawl fishery in terms of kinds of fish utilized, resulting from the lack of sufficient haddock to supply an expanding market, the use of modern processing methods which prepare the various species in equally convenient form, and changes in the market as the result of the above factors. In 1929, 66 percent of the catch of the groundfish fleet consisted of haddock. By 1937, owing largely to the increasing catch of other species, the proportion of haddock had decreased to 36 percent, while redfish had increased from 0 to 15 percent, and cod, pollock, whiting, and flounders showed smaller increases. Partly as a result of this shift to other species during periods when haddock were scarce, and partly owing to the increased use of frozen fillets, haddock price fluctuations have been greatly reduced.

This fundamental change in the groundfish market should have significant repercussions in the fishery for haddock and other species. In the past, with the mass production market concentrated on one kind of fish, it was possible for the commercial fishery to reduce the average abundance of that species far below the level of others found in the same general region. With the present development of a less specialized market this should no longer occur. Increased scarcity of one species will cause a shift in fishing intensity to another before severe depletion occurs, with the result that the abundance level of the various marketable species will tend to fluctuate together.

With the above developments the haddock problem in many respects becomes a groundfish problem, for it no longer will be possible to explain or predict fluctuations in the haddock catch on the basis of the haddock population alone. The general condition of the other major commercial species must also be known. This extension of the catch analysis is one of the most pressing requirements of the investigation. Continued progress toward the accurate prediction of catches and rationalization of the fishery requires understanding of the abundance of cod, redfish, and pollock as well.

Progress of investigation.—The haddock investigations are designed primarily to provide an accurate measure of the extent and cause of changes in abundance and to develop a practical plan of exploitation that will maintain the yield at the optimum level. Accurate figures of total haddock catch are collected for each major fishing area in cooperation with the Division of Fishery Industries. Assembled records of total catch show that haddock landings at principal New England ports increased from about 60,000,000 pounds in 1921 to nearly 250,000,000 pounds in 1929, dropped to 140,000,000 pounds in 1932, and have since then fluctuated about that level.

The relative abundance of haddock from year to year is being studied through the detailed analysis of the catch records of three groups of trawlers. This yields an accurate measure of their average "catch per day's fishing." Extensive and detailed analysis of otter trawl catch records demonstrates that in the Georges Bank-South Channel region the catch per unit of effort more than doubled between 1923 and 1927, then dropped precipitously to one-fifth that value in 1931. Catch per unit then gradually increased to a level in 1936 nearly double that found 5 years earlier, but little more than one-third as high as during the 1927 period.

Fluctuations in total catch have been due to changes in the abundance of haddock on the banks and to changes in the amount of fishing effort expended. Fluctuations in abundance, as measured by "catch per day," have been primarily due to differences in the numbers of young haddock produced during successive spawning seasons, combined with a rapid depletion of the stock of older fish due to the very intensive fishery.

Growth rate on the various fishing grounds is studied through the analysis of length frequency data and scales regularly collected on the Boston Fish pier and at sea on commercial trawlers and on research vessels. Because of the limited amount of time available for the study of growth rates only general conclusions may be drawn. The growth rates on the different parts of Georges Bank differ considerably among themselves, but when samples are considered *en masse*, the growth is seen to be considerably greater than on the Nova Scotian banks, especially for the younger sizes. Over the entire haddock range covered by the New Egland fishing fleet growth appears to be greatest in the South Channel region and least on Banquereau.

Passive migrations of haddock eggs and larvae have been studied through the systematic sampling with plankton nets of the egg and larval population in the South Channel-Georges region and through the determination of ocean currents by the use of drift bottles, water temperatures, and densities. It has been found that the principal spawning center is on eastern Georges Bank, with a smaller one in South Channel. The eggs from eastern Georges Bank drift to the southwest, where they hatch, part of the larvae being caught in a current circling to the northeast around Georges Shoals. These young fish presumably go to the bottom in this region, and by the end of the winter are found principally on southeastern Georges Bank. The eggs and larvae not caught in the northeast current are carried to the westward toward Long Island, where they presumably perish, for no young haddock have been found on the bottom in this region. The data indicate that no appreciable number of eggs and larvae reach Georges from other banks, demonstrating that this area is a self-contained unit insofar as the supply of young is concerned.

Most of the information concerning the active migrations of older fish is derived from analysis of length and age data. Results indicate that there is no movement of young haddock between Georges and the Nova Scotian bank, but that a limited intermixture of the older fish takes place. For practical considerations the populations of the areas east and west of the Fundian Channel may be considered independent.

The relative abundance of year classes is being determined through the age analysis of the commercial catch and of material collected on the *Atlantis* trawling trips in 1935 and 1936 through the cooperation of the Woods Hole Oceanographic Institution. The haddock work is urgently in need of facilities for continuing such deep sea trawling to determine the abundance and distribution of 1-, 2-, and 3-year-old haddock, as it is becoming more and more evident that major changes in both the distribution and size of the catch depend on the abundance of these smaller sizes during the previous year.

During 1937 the haddock work continued under the direction of W. C. Herrington, assisted by J. R. Webster and H. M. Bearse. Principal effort was concentrated on the collection of accurate data showing the total amount of haddock taken from each fishing ground, the continuation and improvement in accuracy of the determination of catch per unit of fishing effort, the analysis of catch records going back to 1914, to obtain a similar measure of haddock abundance for comparison with the present trend, analysis of length and scale data to determine growth rates and mass intermigrations, and analysis of material collected on *Atlantis* trawling trips in 1935 and 1936, to show changes in the composition of the population on Georges Bank, sex ratios, growth rates, and migrations.

Field work to a large extent was limited to the Boston Fish Pier, where Mr. Bearse continued the collection of data. Information for each boat and trip showing sailing date, landing date, and areas fished was supplied to the Division of Fishery Industries and incorporated in its statistical reports. In addition to the above field work, trips were made on the trawlers *Winchester* and *Fordham* to obtain catch data.

Although all of the statistics for 1937 are not yet available, it is possible on the basis of 8 months' data to estimate the changes in the haddock population that affected the commercial fishery in 1937. The abundance as indicated by average catch per day in the Georges Bank region decreased about 20 percent, while that on the Nova Scotian banks decreased about 26 percent. As a result of the relatively poorer yield from the latter area, the fleet spent an increasing proportion of its fishing time on Georges Bank, and this together with the increased fishing capacity resulting from the construction of new boats, resulted in an increase in the total catch on Georges Bank from 75,500,000 to 83,000,000 pounds, a rise of 10 percent, in spite of the decreased abundance. Apparently the decrease in the proportion of time spent on the Nova Scotian banks about equalled the increase in effort from the addition of new boats, for the decline in catch (25 percent) approximated the decline in catch per day (26 percent).

The downward trend in abundance on Georges Bank followed moderate increases in 1934, 1935, and 1936, while on the Nova Scotian banks the downward trend marked the third year of decline, a total drop in catch per day (by weight) of about 33 percent since 1934. The year 1937 also marked the return of the bulk of fishing activities to Georges Bank. During the 1929 period this area supplied around 90 percent of the total haddock catch, but this share had dropped to 30 percent in 1934, as the fleet sought more distant fishing grounds to maintain its catches. Following 1934, the fishery again swung back to Georges as the result of decreasing abundance on the Nova Scotian banks and the relatively better conditions on Georges, with the result that the proportion of the catch supplied by the latter increased from 30 percent in 1934 to 40 percent in 1935, 52 percent in 1936, and 61 percent in 1937.

Analysis of records prior to 1923 to yield catch per day figures comparable to present data has proceeded, but is not yet complete.

Further analysis of the data collected on *Atlantis* trawling trips in 1935 and 1936 in conjunction with data from the commercial catch

indicates that the exploratory trip in 1935 did not provide a representative sample (in respect to age and size composition) of the Georges Bank population, but that the 1936 data were much better. The work clearly demonstrates that the commercial fishery does not sample all sizes of marketable haddock in equal proportions. Owing to the price differential between large and scrod haddock, the former generally are over-sampled. It is concluded that field work of the kind carried on from the *Atlantis* is absolutely essential to supplement data from the commercial catch. Such work makes possible an estimation of the relative abundance of 1-, 2-, and 3-year haddock which are not sampled by the commercial fishery; provides information concerning the haddock populations in areas not fished by the trawling fleet because the fish are too small or too scattered; and gives some check on the accuracy with which the commercial catch samples the population. In addition, many valuable data are obtined on growth rate, sex ratio, and distribution.

Considerable progress was made in combining and summarizing length-frequency data collected in 1936 and 1937. One-month and 4-month summaries by subareas have been prepared so that the data now are ready to be broken down into age classes. Analysis of scale samples was confined to the *Atlantis* collections and contributed to the results discussed above. During the work on length frequencies, a careful analysis was made to determine the most satisfactory method for sampling the commercial catch and for combining the samples. The results of this investigation were reported in a paper read before the American Statistical Association.

Prospects for 1938.—In Progress in Biological Inquiries, 1936, it was stated that in 1937 a moderate decline in catch per unit of effort on Georges Bank might be expected while the total catch should increase somewhat. The catch per unit actually decreased about 20 percent (8 months' data) while the total catch increased 10 percent. For the Nova Scotian banks it was predicted that there would be a considerable decline both in catch per unit of effort and in total catch. The catch per unit actually decreased about 26 percent (8 months' data) while the total catch decreased about 25 percent.

In view of the facts that analysis of 1937 data is not yet completed and that data on the abundance of the 1936 class (which will reach marketable size in 1938) are lacking, it is impossible to make definite predictions for the 1938 season. The catch per day both in the Georges Bank region and on the Nova Scotian banks will undoubtedly be considerably less than in 1937 unless there is a great influx of scrod during the summer and fall (1936 class on Georges Bank and 1934 class on the Nova Scotian banks). Unfortunately, the relative abundance of these classes on the grounds mentioned is not known, for the members of these groups were too small to be taken in significant numbers by the commercial trawlers during 1937 and no boat was available for special trawling trips such as were made on the *Atlantis* in 1935 and 1936. Unless the 1936 and 1934 classes appear in unusual abundance, it appears that the decline in catch per day will be sufficient to cause a considerable drop in total haddock catch in spite of the increase in the size of the fleet.

MACKEREL

Although statistics for the 1937 mackerel season on the Atlantic coast are not completely assembled, a fair estimate of the total United States vessel catch lies between 14 and 15 million pounds. This is the poorest catch since 1922, when landings by vessel fishermen were about 9,000,000 pounds. The 1937 catch falls about 65 percent below 1936, when some 40,000,000 pounds were landed at eastern ports.

This great decline brought serious consequences. Many fishermen who usually depend upon the mackerel fishery for their livelihood during a great part of the year were forced either to engage in some other fishery, such as dragging, or to continue after mackerel at negligible profit. The majority of the fleet adopted the latter course. In either case, the financial return was reduced greatly under expectations. Another aspect of the situation is well illustrated by cold storage statistics. During the previous 5-year period, the New England and Middle Atlantic cold storage holdings of mackerel reached a maximum in September or October. This reserve, which averaged 10,000,000 pounds, was built up during summer and early fall when prices were low. In October of 1937, on the other hand, less than 2,000,000 pounds were in storage, and even after continued speculative purchases at high prices, the maximum holdings attained were but 3,000,000 pounds by the end of the year.

In the light of developments during 1937, the necessity for an accurate mackerel catch forecast stands out more than ever before as an important fisheries problem. The biological basis for any successful prediction of catch must be a sound knowledge, not only of the mackerel, but also of its environment. Acquisition of such knowledge has occupied the principal attention of the mackerel investigators during the past 10 years and a report is now in preparation covering results of the work through 1936. Briefly summarized, they are as follows (O. E. Sette, Report to the North American Council on Fishery Investigations, September 1937):

Winter home.—The species winters along the edge of the continental shelf, most probably from the offing of Chesapeake Bay to the Fundian Channel, and possibly as far east as Sable Island Bank. When in the winter habitat, mackerel probably are in mid-depth rather than on bottom or at the surface.

Migrations.—The population migrates in two divisions: a southern contingent that moves shoreward between Chesapeake and Delaware Bays in April, thence northeastward along the coast to the Gulf of Maine, in the western part of which it spends its summer, returning southward around Cape Cod in late October; and a northern contingent that moves shoreward toward the coast of southern New England in late May, thence northeastward across the Gulf of Maine, along the Nova Scotian coast, and into the Gulf of St. Lawrence where it spends the summer. This division is believed to emigrate along the Nova Scotian coast and through the western portion of the Gulf of Maine (where it supports an important November drift-gill-net fishery) and out to sea past Cape Cod. The northern contingent, when migrating along the Nova Scotian coast in the spring, may be joined by additional members from directly offshore and when leaving in the fall may lose members in an offshore direc-

tion if any winter as far eastward as the outer edge of the Nova Scotian banks. Both southern and northern contingents leave stragglers behind them along their migratory routes so that some mackerel, usually the smaller adolescent individuals, populate the coasts of southern New England and Nova Scotia, even though the main bodies are in the Gulf of Maine and the Gulf of St. Lawrence.

Horizontal distribution.—During the summer sojourn mackerel predominantly inhabit the open waters over the inner part of the continental shelf. Important numbers are regularly found neither in enclosed bays nor in far offshore positions. The waters of the deep central portions of the Gulf of Maine are particularly avoided and catches are only occasionally made over the offshore banks. Larger individuals tend to be farther offshore than smaller ones.

Vertical distribution.—The marked thermocline established in spring and persisting through summer forms the lower boundary of mackerel distribution, the underlying colder water imposing an effective barrier to downward movement. Variations in position and intensity of the thermocline affect the success of the fishery.

Schooling habits.—Mackerel are usually aggregated in dense schools—a form of association that probably is advantageous in feeding on plankton. The lesser swimming ability of smaller individuals, resulting from the relation between volume of muscle and surface area, causes a marked but variable schooling according to size.

Feeding habits.—The American representatives of the species feed almost entirely on plankton, but additional observations are needed relative to large offshore individuals, which, like their European relatives, may subsist on small fishes during the late summer and autumn months.

Spawning.—The inner portions of the continental shelf between Cape Hatteras and Cape Cod form the most productive spawning ground; next is the southern half of the Gulf of St. Lawrence. Spawning in intermediate areas is of slight importance excepting perhaps the southern part of Massachusetts Bay which has high concentrations of eggs in spite of its small area. Spawning takes place in April and May south of Cape Cod, in May and June in Massachusetts Bay, and in July and August in the Gulf of St. Lawrence.

Early life history and growth.—Eggs hatch in 3 to 8 days, depending on temperature. The earliest post-planktonic individuals to be found during the course of the investigations were 2 to 6 inches long in the latter part of July. By the end of the first season mackerel are 7.5 to 10.25 inches long; by the end of the second season, 10 to 14 inches long. Thereafter, growth is slower. By the tenth year mackerel average about 18 inches in length, and weigh 2 to 2½ pounds.

Although many of the more important features of mackerel biology are fairly well understood, and by themselves will furnish a reliable catch forecast in some years, the fact that environmental conditions exert a profound effect upon the actual catch was well illustrated this year. In the annual prediction for 1937, it was estimated that the abundance of mackerel would be about 80 percent of the 1936 level. The actual catch, however, reached about 35 percent of the 1936 level. The difference appears to have been due chiefly to inability of purse-seine fishermen to find fish in the usual localities.

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The spring run fell under expectations, but not to an alarming degree. During summer, the decrease was more pronounced. Purse seiners found schools unusually scarce and close to shore, their operations being hampered at times by shallow water. At the same time, shore-trap operators enjoyed their best mackerel catches in many years. The mackerel populations were not wholly centered along the shore, however, since otter trawlers on Georges Bank caught unusual numbers of them incidentally throughout the summer, evidence of a relatively large offshore dispersal. Furthermore, many observers noticed a scarcity of *Calanus*, the favorite "red feed" of mackerel, on the usual mackerel feeding grounds. This may explain the scarcity of mackerel in these areas. Reasons for the scarcity of *Calanus* are not known but unusually warm ocean temperatures offer a possible explanation.

The fall mackerel season showed evidence of improvement in October, and in November the landings, though small, were greater than in the previous year. This improvement preceded an event which made fishing history, a continuation of mackerel seining into January 1938.

Mackerel work during 1937 was continued under the direction of O. E. Sette. Field data were collected principally by F. E. Firth. These comprised 534 interviews to obtain information on individual trips, measurement of 36,139 mackerel for length frequency analyses, and collection of 1,135 scale samples. In October, O. E. Sette, who had directed the North Atlantic investigations and conducted the mackerel work since 1926, was transferred to the Pacific coast. It is expected that a comprehensive report covering the results of his investigation will be ready for publication during the coming year. J. R. Webster has been assigned to continue the mackerel work in 1938.

MIDDLE AND SOUTH ATLANTIC FISHERY INVESTIGATIONS

R. A. Nesbit, *in charge*

The fisheries of the Middle and South Atlantic States offer an opportunity to realize substantial benefits from scientifically controlled management. It is difficult to escape the conclusion that these fisheries have been exploited inefficiently for many years. In spite of developments which might be expected to increase production, such as the expansion of markets through population increase in the Seaboard States, technical improvements in fishing methods and distribution facilities, extension of intensive fishing activities to areas not previously fished, more intensive fishing on the older grounds, and development of markets for species not previously utilized, the production of food and game fishes has not merely failed to increase but has actually declined during the present century.

This situation is undoubtedly an illustration of the modern theory of fishing exploitation which states that in the long run a fishery of moderate intensity will, by maintaining a high level of abundance, produce an annual crop at least as great and usually greater than an excessive fishery, and at a much lower cost. Statistical records show that the less intensive fishery of 40 years ago actually did pro-

duce more than the fishery of the present day. Since the only source of real income from the fishery is the difference between the sale price of the product and the cost of production, it follows that a moderate, hence low cost, fishing could provide employment either for the present number of fishermen at a higher income level or for more fishermen at the present standard of income, and in either case with a substantial reduction in the hours of labor per fisherman per year.

In addition to the economic gain to the commercial fisheries, restoration and maintenance of high levels of abundance will also improve angling conditions. Many species, including bluefish, weakfish, fluke, winter flounders, sea bass, scup, tautog, kingfish, croaker, striped bass, tuna, and swordfish, support a great recreational fishery which is growing in importance.

Although the objectives of fishery management in this region are clear, the problem of devising and enforcing measures to accomplish them is extremely difficult. A horizontal reduction in fishing activity in all localities and by all methods of fishing would not lead to maximum efficiency, nor would a return to the fishing and distribution methods of 40 years ago. The gross yield of the fishery is the aggregate of the yields of many species which differ greatly in life histories and habits and in their capacity to withstand the effects of the fishery. Most of the important types of gear, such as pound nets, otter trawls, purse seines, haul seines, and gill nets, take more than one species. Consequently, modifications of fishing methods and fishing intensity which would lead to maximum efficiency for one species might result in inefficiency through incomplete utilization of other species.

It is the object of the scientific investigations of the Bureau to devise equitable and practical means of maintaining adequate numbers of spawners and of harvesting the crop produced by each year's spawning as nearly as possible at the size and age at which the greatest yield in pounds can be taken with the minimum fishing effort, i. e., at the lowest cost.

For the present, at least, the most profitable field for the application of fishery management practices appears to be that of eliminating as far as possible the present wide spread destruction of fish too young to be marketable and marketing of fish which would be more valuable if allowed to grow to larger sizes.

It is recognized that many difficulties exist. The diversity of sizes and shapes of the several species taken by pound nets, seines and otter trawls renders it difficult to permit the escape of undersized fish by increases in the mesh size of the netting, for meshes which allow the escape of the young of large species may also allow legitimately marketable sizes of smaller species to escape. In some localities at least, increase in the sizes of mesh would result in great inconvenience in fishing through the gilling of certain sizes in the meshes. However, many species, including scup, sea bass, striped bass, winter flounders, and fluke, are sufficiently hardy that the majority would survive the handling incident to sorting. Steps should be taken to require that catches by pound nets, seines, and otter trawls be sorted as soon as they are taken from the net, wherever and whenever conditions of weather and tide permit, even at the

cost of some inconvenience and delay in removing catches from the nets.

If this line of attack on the conservation problems of the region be adopted by even a few of the several States in which jurisdiction over territorial waters is vested, the expected benefits will not be wholly nullified by failure of adjacent States to adopt similar measures. In this respect the proposal differs from plans to restrict the catch of the larger and more desirable market sizes, for unless closely coordinated action be taken by all of the States concerned restriction in a single State may be expected to stimulate fishing in adjacent States so that little or no reduction in the catch of the larger sizes from the migratory population as a whole may be expected.

Until October 1937 scientific activities in the Middle and South Atlantic region were administered from the headquarters of the North and Middle Atlantic Fishery Investigations at Cambridge, Mass. In October headquarters were established in the Horticulture Building of the University of Maryland at College Park, Md., under the direction of R. A. Nesbit. The courtesy of the University in providing office and library facilities without cost to the Bureau is gratefully acknowledged. W. C. Neville is carrying on the investigations of shore fishes of the Middle Atlantic States, formerly under Mr. Nesbit's supervision, although Mr. Nesbit is continuing analysis of squeteague data. Field headquarters for study of the shad fishery were established in the Charleston Museum, Charleston, S. C., office and laboratory facilities being generously provided by the Museum. John C. Pearson is in charge of the Charleston office, assisted by Louella Cable, Charles O. Hathaway II, and Oliver A. Duff.

SHORE FISHES

Field observations of this group of species have been conducted on a greatly reduced scale since 1932, when economies in administration were effected.

To a large extent this reduction in Bureau activities has been compensated for by increased scientific studies by the conservation departments of several States in the region, working in cooperation with the Bureau's staff. Rhode Island has established a laboratory in Narragansett Bay. The Rhode Island investigators, under the direction of Dr. Charles Fish, Professor of Zoology in the Rhode Island State College, have cooperated in a program of tagging winter flounders and have begun valuable studies of the survival of flounder fry planted by the hatcheries. Connecticut has sponsored an investigation of striped bass, preliminary results of which were published during the year. New Jersey has undertaken tagging experiments with young striped bass salvaged from condenser screens in Delaware Bay. Maryland has established an effective scientific organization under the supervision of R. V. Truitt, Professor of Zoology in the University of Maryland and director of the Chesapeake Biological Laboratory. Good progress has been made in studies of shad and striped bass. North Carolina has contributed substantially to the cost of the cooperative striped bass investigations conducted by Connecticut.

In New York the biological survey for 1938 will cover the marine district. Mr. Neville has devoted much time in 1937 to conference with the scientists of the New York Conservation Department in order

that the 1938 survey may benefit by the experience of Bureau investigators in this area.

Investigations were conducted by the Middle and South Atlantic staff during 1937 as follows:

Squeteague.—Two thousand two hundred squeteague, mostly yearlings, were tagged in June and early July in Pamlico Sound, N. C. This experiment was planned to test the view, suggested by scale studies and other observations, that the unmarketable yearlings destroyed in Pamlico Sound in the early summer include many individuals spawned the previous year in more northern waters which, if spared, would migrate northward in midsummer. Contrary to expectations, all of the recaptures in 1937 were made locally in Pamlico Sound. This was doubtless caused by the unusually mild winter. Young squeteague spawned in northern localities were not driven as far south as usual during the winter but struck in to the shores in spring much farther north. Unprecedented numbers of yearling squeteague were observed in the spring and summer in New York and the scales of the Pamlico Sound yearlings indicated that few, if any, fish of northern origin were present. This is in marked contrast to the early summer of 1935 when about one-third of the Pamlico Sound yearlings were found to be of northern origin. This tagging experiment will be repeated following a more nearly normal winter.

Scup.—Continued large catches by both winter and summer fisheries indicate that the series of successful spawning seasons which began in 1927 are still continuing. The wasteful practice of destroying large numbers of small scup which persists will accentuate the decline which may be expected to occur when this series is broken.

Progress on Mr. Neville's report on this species was interrupted by additional duties arising from change of headquarters from Cambridge, Mass., to College Park, Md.

Winter trawl fishery.—Mr. Neville spent the greater part of January, February, and March 1937 aboard trawlers engaged in this fishery. His observations indicate that the problem of devising savings gear to spare small fish now wasted by the fishery is so complex that extended experiments will be required. A research vessel equipped for trawling or sufficient funds for charter of a commercial trawler will be required before this work can be undertaken.

Winter flounder.—This species is the basis of a commercial fishery in New York and southern New England and of an important angling fishery in Rhode Island, Connecticut, and New York. Tagging experiments were made in Great South Bay, New York, and in various localities in the vicinity of Narragansett Bay, R. I., to measure the intensity of the fishery and the distribution of the strain between sport and commercial fisheries, and also to determine whether the migrations of these fish are sufficiently limited that conservation regulations by individual States would be practicable. Rhode Island scientists cooperated in the Narragansett Bay experiments. Of the 1,718 flounders tagged during the last week in April 1937, in Great South Bay, 304, or 18.6 percent had been recaptured up to January 1, 1938. About four-fifths of the tagged fish recaptured were taken by anglers and about one-fifth by commercial fishermen. Of the 998 winter flounders tagged in Rhode Island, 128, or 12.8 percent, were recaptured in 1937. Of those recaptured, about three-fifths were

taken by commercial fishermen and two-fifths by anglers. Practically all of the recaptures from both experiments were made within the territorial waters of the States in which tagging was done, indicating that the benefits of any conservation measures adopted by these States will not be nullified by possible failure of adjacent States to adopt equivalent measures.

Since this is one of the hardier species, it is well adapted to conservation measures based on selective fishing, that is, on protection of those sizes which are more profitably allowed to grow as long as the gains from growth more than balance the losses from natural mortality. Further studies of this species will be directed toward an estimate of the most desirable minimum size limit.

ANADROMOUS FISHES

Striped bass.—In April 1936, an investigation of the striped bass was undertaken through the efforts of the Connecticut State Board of Fisheries and Game. From the first this investigation has been conducted on a cooperative basis. Connecticut sportsmen financed the first 3 months of the work, the State Board of Fisheries and Game then supported the investigation and the American Wildlife Institute contributed a substantial sum in the spring of 1937, when a break in the continuity of the work would have been a severe blow to its progress. In July 1937, the Bureau of Fisheries insured the financial backing of the work for a full year from that date by the employment of Daniel Merriman, who had conducted this work for the Connecticut Board of Fisheries and Game. Several Atlantic seaboard States have contributed to the investigation, and every State from New Hampshire to North Carolina has given its fullest cooperation in some phase of the work. Particularly is this true of Maryland, with its concurrent investigation on the striped bass under Dr. Vadim D. Vladykov. The cooperation of North Carolina, through Mr. Chalk, Commissioner of Inland Fisheries, and of various Long Island fishing clubs has been invaluable. Massachusetts sportsmen have led the way in collecting material on the striped bass through the efforts of David A. Aylward, secretary of the Massachusetts Fish and Game Association, and Oliver H. P. Rodman, editor of Hunting and Fishing.

In colonial times the striped bass was very abundant along the whole Atlantic coast from North Carolina to Nova Scotia. By 1850, it had greatly declined in abundance and in recent years it has been almost a rarity north of Chesapeake Bay. The decline was less marked in the latter locality and in North Carolina, although serious enough especially in the years between 1930 and 1936, to cause concern.

In 1936, however, unusual numbers of 2-year-old striped bass appeared in Chesapeake Bay and also in New York and in southern New England. Catch records indicate that abundance was greater in the latter localities than at any time during the preceding 50 years. In Chesapeake Bay the large catches of 2-year-old fish were preceded in 1935 by a great abundance of yearling bass, but careful inquiry failed to disclose any evidence of a similar phenomenon in the more northern localities. Tagging experiments showed that many of the 2-year-olds

which summered in Connecticut in 1936, migrated southward in the autumn, some of them as far as the sounds of North Carolina.

These observations indicate that this species is subject to strong year-class dominance and that bass migrate more than was formerly suspected. It is of especial significance that the large 1934 brood was produced in a year when the numbers of mature adults were not only no greater than during the several years preceding, but were also well below average. Consequently, the restriction of the catch of mature striped bass in the interest of augmenting the spawning reserve is of doubtful value even in such localities as Chesapeake Bay, where reproduction is occasionally very successful. It is even more questionable whether protection of mature fish will be profitable in more northern localities where the principal increments to the stocks appear to come from immigration.

This does not imply that the present practice of virtually unrestricted fishing is desirable. Results of tagging experiments indicate that the fishery takes a very heavy toll of successful broods before they mature. It is believed that restriction of the catch of the younger and smaller fish would increase the total yield from each brood and would incidentally augment the numbers of spawners.

Shad.—The gross catch of shad has declined from nearly 50,000,000 pounds in 1897 to less than 9,000,000 pounds in 1935. It is inconceivable that the decline in yield of this choice species does not indicate diminished abundance. Since the shad is not subject to commercial fishing during its period of growth in the sea, the causes of depletion must be sought in human interference with spawning migrations into coastal rivers.

The following explanations of diminished reproduction have been offered: (1) interference with spawning by pollution and by obstruction of streams by dams; (2) insufficient numbers of spawners resulting from over-fishing. It is not to be doubted that complete blocking of the Susquehanna River by the Conowingo dam has eliminated a considerable spawning area and it is probable that severe pollution in the Delaware has at least contributed greatly to a virtual disappearance of the shad runs in that stream. On the other hand, a number of rivers which are almost completely free from pollution have shared in the general decline and the Hudson River, which certainly cannot be said to be unpolluted, has staged a most spectacular recovery, the catch increasing from less than 100,000 pounds in 1917 to a yield of nearly 3,000,000 pounds in 1936.

The recovery of fishing in the Hudson River is attributed by the New York Conservation Department to the measures which it has adopted to insure that sufficient numbers of spawners are allowed to escape the fishery. On the other hand, it is believed by many that the shad is highly migratory in its habits and that the increased runs in the Hudson River are merely the result of a desertion of southern rivers by the stocks which usually seek them.

The former explanation seems more likely but decision must be reserved until the results of tagging experiments, scale studies and other tests of the parent stream hypothesis are available. Consequently, considerable effort will be devoted in 1938 to such observations and experiments.

A preliminary experiment in October 1937, indicated that when young shad about 2½ inches long are marked with internal tags, about one-third survive the initial shock of handling and operation. Unfortunately, the survivors as well as unmarked controls eventually succumbed to unfavorable aquarium conditions so that it is not known whether such tags will be retained indefinitely. Further experiments will be made in 1938.

An attempt will also be made to tag spent shad to determine whether they return to the same stream each year.

If, as is probably true, the increase in abundance in the Hudson River is the result of regulations which permit an adequate escapement of spawners, the numbers of shad spawning in the Hudson River for the second or third time should be greater than in the seriously depleted southern streams. There are present on some shad scales eroded bands resembling the spawning marks of salmon. If these prove to be spawning marks and if examination of the scales of spent shad indicates that spawning invariably results in the formation of such marks, it is expected that comparison of the numbers and the percentages of "repeaters" in the Hudson River and in southern streams will serve as a basis for judging the effectiveness of such regulations as may be adopted in the southern areas.

A serious obstacle to effective study of the shad fishery is the lack of detailed records of the catch. Better records of the total catch will be needed to convert the estimates of the percentages of "repeaters" into estimates of the actual numbers of spawners escaping the fishery. Records of changes in abundance in terms of catch per unit of fishing effort will be needed in order to follow in detail the results of such regulations as may be recommended. To correct this lack of data, collection and analysis of shad catch records were begun in the Chesapeake region by Ferdinand C. Latrobe and in South Carolina by Oliver A. Duff. The conservation officials of Maryland, Virginia, and South Carolina and the staff of the Bureau's Division of Fishery Industries are cooperating in this work.

Should it eventually appear that provision for an adequate reserve of spawning adults is the principal requirement for maintenance of abundance, the problem of determining the optimum escapement will be of primary importance. Protection of spawners in excess of the numbers needed for reproduction is obviously wasteful, and inadequate protection prevents full realization of the productive capacity of the resource. An attack on this problem was begun by initiation of studies of early life history of the shad in the Edisto River, S. C., by John C. Pearson, assisted by Charles O. Hathaway II. Louella Cable also began studies of the plankton cycle and the food habits of young shad in the same river.

It is notable that many years of artificial propagation have failed to halt the decline in abundance of shad. Although it is possible that the decline would have been much greater had hatcheries not been operated, it is desirable to test carefully the effectiveness of present methods of artificial propagation and to experiment with methods of carrying fry to the fingerling size. A beginning on such a program of investigation was made by Mr. Pearson at the Edenton, N. C., hatchery. Pond and laboratory facilities have been placed at his disposal at this hatchery and at the Orangeburg, S. C., hatchery by the Division of Fish Culture.

SHRIMP INVESTIGATIONS

MILTON J. LINDNER, *in charge*

During 1937, as in preceding years, the shrimp investigations have enjoyed the cooperation of the Louisiana Department of Conservation, the Texas Game, Fish and Oyster Commission, and the Georgia Department of Natural Resources. The San Patricio Canning Co., of Aransas Pass, Tex., has continued to furnish office space for the Texas investigator. In addition, the City of Gulfport, Miss., during the past year supplied dockage and locker space for the *Pelican*.

There has been a steady addition to the shrimp fishery of new, larger, and more powerful boats drawing larger trawls. This continued increase in fishing effort has been under way for the last several years and is especially evident on the Atlantic coast. The expansion of the fishing fleet, both in size of the individual boats and in their aggregate numbers, has resulted in an increase in its fishing radius.

The South Atlantic fishery.—The Atlantic fleet, comprised mainly of boats originating in Florida, moves along the coast from North Carolina to Florida with the concentrations of shrimp. As a general rule the summer and early fall fishery is most productive between North Carolina and Georgia. During late fall and winter, however, the shrimp and the fishing fleet are concentrated in the area between St. Augustine and Cape Canaveral, Fla. During the past several years, owing to intensive fishing in more northern areas by the rapidly expanding fleet, the Florida winter fishery has diminished in importance. It appears evident that the greater part of the shrimp are being caught before they reach central Florida. As a result, it is expected that a portion of the Atlantic fleet will move into the Gulf during the winter of 1937–1938.

While the supply shows no signs of serious depletion, the South Atlantic shrimp fishery seems to have reached the maximum of production possible under the present system of management. Although the total catch has not declined, neither has it increased with the augmented fishing effort. Obviously, if more and more gear continue to enter the fishery, the economic stability of each unit will be lowered and a number of the marginal units will find it unprofitable to operate.

From our present understanding of the shrimp it appears that an increase in the total poundage taken by the South Atlantic fishery can be secured only through better protection afforded the young. The intensified fishery is making greater inroads on the young shrimp, a condition which in turn will cause a reduction in the total pounds landed, even though depletion may not occur. As fishing intensity increases, shrimp fishing will therefore become poorer from the viewpoint of the fisherman.

Tagging experiments conducted by William W. Anderson during the past several years have shown that the larger Georgia and South Carolina shrimp move south into Florida during the winter. During the fall of 1937 shrimp were tagged and released over practically the entire northern range of the fishery in order to determine whether or not large individuals from the northern limits also migrated south to become a part of the Florida winter fishery. Tagged shrimp

were released along the coast from Beaufort, N. C., to Brunswick, Ga. Returns have been secured in Florida from these releases, showing that at least some of the North Carolina shrimp normally migrate to Florida during the winter. Apparently then, the South Atlantic shrimp fishery should be considered as a single unit rather than as separate fisheries, each limited within the boundaries of one of the several States involved. Any regulatory measures or lack of regulations in one section will affect not only that section but other portions of the fishery as well; hence, it is advisable that the States of North Carolina, South Carolina, Georgia, and Florida attempt a cooperative management of their shrimp fisheries, with regulations as nearly uniform as possible.

Present knowledge of the movements of shrimp suggests many additional questions. What is the fate of the large shrimp that migrate from the northern areas into the Florida winter fishery? Do these shrimp normally return north in the spring to spawn? If there is a return migration, do the shrimp come back to spawn in the locality in which they were reared or is the return more or less haphazard? Is the fishery so intense that practically all the winter migrants are captured before they have an opportunity to return north? What changes can be expected in the future population of shrimp from a more intensive fishery? To what sizes of shrimp and at what seasons of the year can regulatory measures be most profitably applied? Do the shrimp perish at the age of 1 year or is there a breeding reserve in offshore areas beyond the range of the present commercial fishery?

It is expected that the current tagging program will solve many of the problems relating to migrations along the South Atlantic coast. These studies, in addition to yielding positive knowledge of the movements of the shrimp, are supplying data on the intensity of the fishery and the rate of growth of the various sizes of commercial shrimp at all seasons of the year.

The extremely important question of a possible breeding reserve of shrimp more than 1 year of age in offshore waters along the South Atlantic coast cannot be answered satisfactorily however, until exploratory fishing can be performed in the deeper waters. The *Pelican* may be used in such investigations at some future date. Thorough studies of the coastal population show that no breeding reserve is present in any of the coastal areas; therefore if such stock exists it must be in offshore waters.

The Gulf Fishery.—The most striking development in the Gulf shrimp fishery during 1937 was the large summer and fall run in Louisiana and Mississippi. The run was considerably greater than that of the years immediately preceding and was confined to the above-named States. This run further emphasizes the fact that there are good and bad years with respect to the production of shrimp and that the number of spawners is not the important factor in determining production of young. The 1937 Gulf spring fishery which represents the spawning population was extremely poor and barring the possibility of a breeding reserve of shrimp more than a year old remaining in the deeper waters beyond the range of the commercial fishery, a very small group of spawners was successful in producing

a large number of offspring. It is highly probable that the effluents of the Mississippi River play an important part in determining the success of spawning.

As stated in several previous reports, there is evidence in the Gulf of an offshore movement of large shrimp during the winter. This migration is comparable in many respects to that of the South Atlantic coast; it differs however, in that it is primarily offshore and outside the present commercial fishing range, whereas the South Atlantic movement is coastwise and within the commercial fishing limits. Early in the year the *Pelican*, a 78-foot Diesel vessel, was transferred to the Gulf for the purpose of making exploratory cruises in order to determine whether or not the winter migrants concentrate in sufficient quantities to permit commercial fishing. Owing to insufficient funds, however, the boat was unable to operate during the fiscal year 1937 and it was deemed advisable to postpone operations until January 1938.

In addition to discovering winter offshore concentrations of shrimp, the work of the *Pelican* should give valuable data on the length of life of the shrimp, whether or not there is an offshore spawning reserve in the Gulf, and the extent of the spawning grounds.

Arrangements have been made with Prof. A. E. Parr of the Bingham Oceanographic Institute of Yale University to analyze the salinity samples secured with the *Pelican*. Similar arrangements have been made with Professors H. V. Howe and R. J. Russell of the Department of Geology of Louisiana State University to analyze the bottom core samples which are taken at each trawling station.

The Texas program which has been conducted by Kenneth H. Mosher has been primarily that of sampling the commercial fishery, but during the past 2 seasons, through the assistance of Albert Collier, Marine Biologist of the Texas Game, Fish, and Oyster Commission, tagging operations have been added.

It is known that temperature and salinity affect the behavior of the shrimp, and during the past year it has been determined that tides also enter as a factor. In the vicinity of Corpus Christi, Tex., it was found that better catches of shrimp, as a rule, were made during periods of low than of high water.

John C. Pearson, prior to his transfer to the shad investigations, submitted for publication a manuscript describing the larval stages of the common shrimp and those of four other peneids. This basic work will be of considerable aid in determining the extent of the spawning grounds.

NORTH PACIFIC AND ALASKA FISHERY INVESTIGATIONS

DR. F. A. DAVIDSON, *in charge*

The North Pacific and Alaska fishery investigations, with headquarters in the Fisheries Biological Station at Seattle, Wash., are confined mainly to the solution of problems concerning the maintenance and rehabilitation of the salmon and herring fisheries of Alaska and the salmon fisheries of Puget Sound and the Columbia River. All of the major investigations in progress in 1936 were continued in 1937.

COLUMBIA RIVER SALMON FISHERIES

Investigations of biological and physical conditions affecting the Columbia River fisheries were continued during 1937 by J. A. Craig and A. J. Suomela. Counts of salmon and steelhead migrating over Rock Island Dam in the Columbia River and into the tributary Okanogan and Wenatchee Rivers were formerly part of this investigation. In 1937, however, this work was taken over by the U. S. Bureau of Reclamation and the Washington State Fisheries Department, under the project concerned with the protection of migratory fish at Grand Coulee Dam. The collection, tabulation, and analysis of catch records of the commercial fisheries in the Columbia River was continued to provide data on the annual and seasonal indices of abundance of fish populations in the river system. During the year a report on the history and development of the Columbia River fisheries, including salmon, sturgeon, shad, and smelt, was submitted for publication.

Tagging.—A tagging experiment was conducted for the purpose of obtaining data concerning the spring, summer, and fall runs of chinook salmon which pass through the commercial fishery from May to September, inclusive. The results of such experiments provide data on the minimum distances which the fish travel upstream to spawn, the proportion of the runs which return to hatcheries, the proportion caught by the commercial fishery above the point of tagging and the speed of migration of the runs after entering the river.

In 1936, a total of 1,059 fall chinooks were tagged and liberated between August 16 and September 2. Tagging this season consisted of 21 experiments from May 17 to September 1, inclusive, in which 1,565 chinooks were tagged. Two of these experiments were conducted at a location 1¾ miles above the mouth of the river and the remaining 19 at a location 5¾ miles above the mouth of the river. The runs of salmon were extremely light during the spring and summer and only a few fish were secured for tagging.

Recoveries of the tagged fish amounted to 381 or 24.3 percent of the total tagged. A few recoveries were taken between the mouth of the river and the point of tagging, but none outside the mouth. A total of 38 tags, or 2.43 percent, were recovered at hatcheries on the Columbia River system. One fish bearing a tag was recaptured in the Toutle River, a tributary of the Cowlitz River. Two tags were observed on fall chinook salmon in the Chinook River but they could not be recovered. The remainder of the tagged fish were caught in the main Columbia River. Tagged salmon were recovered up the river as far as Celilo Falls, 190 miles from the point of tagging.

The results of the experiments in 1937 are now being analyzed. These data, together with the data of the 1936 experiments, will be incorporated in a report to be submitted for publication in the near future.

Stream surveys.—With the exception of surveys conducted on portions of four of the major tributaries of the Willamette River system in the State of Oregon, Columbia River stream survey activities in 1937 were again confined to the State of Washington.

In north central Washington tributaries of the four major river systems, the Okanogan, the Methow, the Entiat, and the Wenatchee, have been surveyed. Fifty minor streams were also examined. In

this area a total of 117 dams of all types were found, of which 32 are permanent structures, and 85 temporary. Three of the permanent dams are obstructions at all times, and 21 are barriers at low water only. The number of dams used for irrigation totals 107, of which 23 are permanent and 84 are temporary in nature. Two dams are used for power, 1 for irrigation and power, and 7 for other purposes. There are 143 diversions, of which 133 are for irrigation, 4 for power, 1 for power and irrigation, and 5 for other purposes. In the 34 streams examined in this area, which are part of the 4 major river systems, it was estimated that 35 percent of the river bottom was suitable for spawning purposes, with approximately four-sevenths of this total available to fishes at all times, and three-sevenths unavailable at low water.

In the south central area, the Yakima River system is the only large stream that has been surveyed to date, although 69 minor streams have been examined. In this survey a total of 163 dams were recorded, of which 40 are permanent and 123 are temporary. One hundred and fifty-nine of these are used for diverting water for irrigation purposes and of this number 38 are permanent and 121 are temporary. Five of the permanent dams are complete barriers, 26 are barriers at low water only, and the remainder are passable to fish at all stages of water level. The number of diversions in this region total 280, of which 270 are used for irrigation, 5 for power, 1 for power and irrigation, and 4 for other purposes. In the 34 streams in the south central area that have been examined, it was estimated that 59 percent of the bottom was suitable for spawning, with three-fifths of this total available to spawning fish at all times and two-fifths unavailable at low water.

The survey of the southeastern area of the State of Washington has been completed. This included the following river systems: the Tucannon, Asotin, and Walla Walla Rivers, and 29 minor streams. There were 112 diversion dams in this area, 32 of which were permanent structures and 80 temporary. A total of 172 diversions were found, of which 160 were used for irrigation, 2 for power, 6 for power and irrigation, and 4 for other purposes. In the 17 streams examined it was estimated that 71 percent of the bottom was suitable for spawning, but of this total only one-third was available to fish at all times, two-thirds of the area being unavailable at low water.

The survey of the southwestern area of the State of Washington has not been completed to date. Thus far, a total of 22 dams have been recorded. They are used for the following purposes: 1 for irrigation, 6 for power, and 15 for other uses.

In the State of Oregon stream surveys were conducted on the middle fork of the Willamette River from the proposed flood control dam site at Lookout Point to Tumblebug Creek; on the McKenzie River from the proposed dam site at Quartz Creek to Tamolitsh Falls; on the North Santiam River from the proposed dam site near Detroit to Big Meadows Camp; and on the South Santiam from the proposed dam site at Sweet Home to House Rock Camp at Sheep Creek. During the survey of these streams 4 permanent dams were found, of which three formed partial barriers and one a complete barrier to migratory fishes.

A total of approximately 2,300 miles of stream have been surveyed in the Columbia River drainage up to the present time. Data

derived from all of these investigations were made available on many occasions to interested individuals and organizations, such as State conservation agencies and the National Resources Committee.

PUGET SOUND SALMON FISHERIES

Sockeye.—The Puget Sound sockeye investigation was continued by Dr. George A. Rounsefell.

Daily salmon catch statistics were collected for 1935 and 1936, especially on the Fraser River, where the individual gill net landings were obtained for at least 90 percent of the catch. Daily purse seine landings by boat were obtained for the past 12 years, 1925 to 1936, from Quathiaski, at the northern end of the Gulf of Georgia. It has long been known that a portion of the Fraser River run used the northern route instead of entering through the Strait of Juan de Fuca but no information has been available on its size. In 1936 nearly half a million sockeye were taken in this area. In some years, especially in 1915, 1926, and 1936, the gill nets in the Gulf of Georgia and the lower Fraser River have done much better relatively, than the gear in Puget Sound. Inasmuch as the 3 years in question were extraordinarily warm, it may be possible that the proportion of the run using the northern entrance is largely dependent on temperature. In warm years the sockeye may be feeding farther to the north and so strike the coast in the vicinity of Cape Scott at the northwestern end of Vancouver Island, a fair proportion of the run thus continuing down the inside of the Island.

The usual samplying of the commercial catch was carried on at Anacortes. A feature of the 1937 run was the small average size of the sockeye, which greatly increased the cost of the raw fish to the canneries, as they bought the fish by the piece. The investigation now has available samples of the commercial catch since 1934. The ages of these fish have not been determined pending the completion of this 4-year cycle, but the 1937 scales are now mounted and their reading is under way.

In 1935 the Division of Fish Culture cooperated with the investigation by planting 76,000 fingerling sockeye (1934 egg collection from the Birdsview hatchery on the Skagit River) in Cedar River, a tributary of Lake Washington, and a like number in Issaquah Creek, a tributary of Lake Sammamish, which drains through the Sammamish River into Lake Washington. It is planned during the spring to watch at the Government locks and fish ladder leading into Lake Washington and on the spawning grounds for adult sockeye, to determine whether the plantings were successful in introducing this valuable species. Judging from the available spawning grounds and the general suitability of these lakes to coho and king salmon and to the land-locked kokanee, they might be capable of supporting a sockeye run of fair proportions.

Since it is the duty of the recently formed International Pacific Salmon Fisheries Commission to make a study of the sockeye runs to the Fraser River system it is not planned to collect additional data on this species. Work on the Fraser River sockeye will be discontinued as soon as analysis of the data on hand has been completed.

Dr. Rounsefell also carried on experiments in tagging in an effort to develop tags suitable for the salmon work. Experiments with

rainbow trout showed that the usual strap tags on the tail or on the jaw were not satisfactory. The Atkins tag through the dorsal fin, however, was well retained and should be tried on a large scale with mature salmon. Its visibility is better than that of the strap tag, an especially valuable feature in searching for marked salmon on the spawning grounds.

A new type of tag was also developed and tried out on fingerling king and sockeye salmon. This mark, which was named the "internal anchor" tag, consists of three parts: an ordinary flat plate, similar in shape to the nickel herring tag, but preferably smaller; a second small plate of any desired shape, made out of bright-colored celluloid (except bright shades of red which are attacked by other fish); and a short piece of fine silver chain. The long flat plate is inserted into the body cavity with the chain (which is fastened to its center) protruding through the body wall; the second plate of bright-colored celluloid is fastened by one end to the free end of the chain.

In experiments with king salmon fingerlings there was a heavy loss from over-chlorinated city water but after 161 days the survivors were as follows: 36 percent of the controls, 10 percent of those marked with a large anchor and 20 percent of those marked with a small anchor. These fish were between 2 and 3 inches in length when tagged and the mortality was greater than would be expected from the tagging of slightly larger fish.

After 85 days the survivors of marked sockeye fingerlings are: Controls 100 percent, small anchors 91 percent, large anchors 90 percent, and medium anchors 100 percent.

Coho.—The coho salmon investigation of the causes of the decline in abundance of this important commercial and sport fish and of methods for rebuilding runs of former importance was continued during the past year by George B. Kelez.

During the winter and early spring, final returns from the first Samish River marking experiments [2] were obtained. The total return of 3-year fish from the two lots of hatchery-reared native stock, marked and released in 1934, was 469 fish. Of these, 7 recoveries were from 26,150 fingerlings, averaging 47.4 mm (approximately 1⅞ inches) in length, marked by excision of a pair of fins in May; and 462 were from an equal number of fingerlings, averaging 101.6 mm (approximately 4 inches) in length, marked by fin excision in November. The ratio of return of the large fingerlings to that of the small ones indicated a much higher survival rate due to the prolonged rearing period.

Final returns from 9,800 fingerlings, averaging 49.2 mm (approximately 2 inches) in length, transferred from the Skykomish River and marked and released in the Samish in 1934 were also obtained during this period. Recovery of a total of 11 fish was made from this experiment, a return considerably greater than that from the smaller native fish.

Marked fish returning from the experiments carried on in 1935 in Voight's Creek, a tributary of the Puyallup River were recovered during the late fall of 1937. Two lots of fingerlings had been marked by excision of different pairs of fins. The first of these consisted of 50,000 fish reared at the Puyallup River State hatchery, which aver-

[2] See Progress in Biological Inquiries, 1934 and 1936.

aged 49.7 mm in length at the time of marking, and the second consisted of 25,000 fingerlings, averaging 49.1 mm in length, transferred from the Green River State hatchery to the Puyallup River immediately before marking. With the run virtually complete, recoveries to date number 28 from the native stock and 8 from the transplanted stock. No recoveries have been made at the Green River hatchery.

A further series of experiments on coho fingerlings have been undertaken during the year to determine the effect of various periods of hatchery-rearing on the return at maturity. This work has been carried on at the Quilcene, Wash., station of the Division of Fish Culture. One lot of these fish was released in September and another in December in the Quilcene River immediately below the station. Additional lots of fingerlings from the same brood are being retained in the hatchery ponds for marking and release during the spring of 1938 at the approximate time of normal seaward migration. Exact costs of rearing and handling are being recorded in order that the comparative results of moderate and long rearing periods may be determined.

Because the number of individual lots of fish which can be marked by excision of a pair of fins is definitely limited by the number of possible combinations, an experiment was undertaken to determine the adaptability of the internal tag for this purpose. The use of these tags has heretofore been confined to relatively large fish and has been attended by the disadvantage that an external mark to indicate the presence of a tag is lacking. Both hatchery-reared and wild coho fingerlings, ranging in size from 43 to 80 mm were obtained and tagged with internal celluloid tags measuring 2 by 12.5 mm and of varying thicknesses. One fin was removed from each fish at the time of tagging and the various lots were held in aquaria for 75 days. Losses in the experimental lots ranged from mortality approximately equal to that of the controls to 75 percent greater than that of the controls.

An operation on a larger scale was then undertaken at the Samish River hatchery to test the tags under field conditions. Tags of 0.030 inch thickness were selected on the basis of the previous experiment and the dorsal fin was removed from each fish at the time of marking for external identification. Excessive losses from a fungus infection were encountered with the first lot marked, which was held in troughs inside the hatchery. After treatment with salt baths for some time the remaining fish were removed to an outside concrete pond, where they were held until there was no further daily loss.

Lots of these fish were released in Friday Creek on October 8, October 20, and December 11. If the results from tagging compare satisfactorily with those from fin marking, greater opportunity for comparative studies of individual lots of fish will be afforded.

Sampling of commercial and sport catches for data on size, sex, and age was continued and stream collections of fingerings were made for additional material on early life history and rate of growth of coho salmon. A comparison of scale samples from various points in Alaska with those from the local runs indicates that an increasing number of fish in northern waters are returning to spawn at the age of 4 years. All scales examined have shown only 1 year of residence in the ocean, the 4-year fish in Alaska having remained in fresh water until their third year.

Little increase in local spawning escapements has been noted in recent years and a considerable decrease in the commercial catch has been evident. Since local populations mature almost exclusively in the third year, the coming season should demonstrate the effect on this species of the removal of fixed fishing gear from these waters in 1935. Unless the beneficial results of this reduction in gear are considerably greater than is anticipated, more stringent measures for securing an adequate spawning reserve of this species must be adopted if a continued decline in numbers is to be avoided.

KARLUK RIVER RED SALMON

The investigation to determine the extent and causes of the fluctuations in the size of red salmon runs in Karluk River, Alaska, was continued in 1937 by J. T. Barnaby and A. C. DeLacy.

Operation of a counting weir in the river provides data on the number of adult fish escaping to the spawning grounds. This escapement, together with the daily catches of salmon made by the companies fishing in the Karluk district, is used to determine the total run into the river. The age group composition of the 1937 run was calculated from an analysis of 14,000 scale samples taken throughout the season. This study of the salmon populations spawning in Karluk River is furnishing valuable data on fluctuations in the size of the runs and also on variations in the ratio of return to escapement.

Studies of the relation between the growth rate of young salmon in fresh water and their survival both in the fresh water and in the sea were continued. Samples of seaward migrant young were collected for the purpose of determining the age and length frequencies of the 1937 population. Results thus far obtained from this study indicate a positive correlation between fresh water growth rate and survival.

During the season an examination of 434,000 adult salmon disclosed more than 2,100 marked individuals returning from previous years' marking experiments. The numbers and ages of these marked fish indicates that the mortality rate of salmon while in the ocean is fairly constant. The slight variations which occur in it from year to year are not of sufficient degree to account for the great variations in the total survival of these fish from one generation to another. It is evident that the wide fluctuations in the ratio of return to escapement are due primarily to variations in the natural conditions affecting survival in fresh water.

Studies of the food available for young salmon in fresh water entailed a chemical analysis of the waters of Karluk Lake and its tributary streams as well as the sampling of these waters for plankton content. The phosphorous, nitrate, silica, oxygen, and carbonate content of these waters was determined a number of times during the season. As noted in previous years, phosphorous and silica were the chief limiting factors in the growth of plankton and the associated growth of young salmon which depend upon the plankton for their food supply.

Predatory species.—The Dolly Varden trout is considered the chief predator of the salmon during their stay in fresh water. Although a considerable amount of money is expended every year by the Terri-

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tory of Alaska and the various fishing companies in destroying this char, very little is known about the species. Dolly Varden trout inhabit the coastal streams on both sides of the Pacific from California to Alaska and south to Japan. Some spend their entire life in streams, some live entirely in lakes, while others spend part of their life in a stream or lake and part in the ocean. The mature fish vary in size from 6 to over 24 inches in length, depending on their habitat and the population pressure. They are frequently found with salmon eggs, fry, and fingerlings in their stomachs, and consequently their extermination is desired by most members of the salmon industry.

As these fish are very abundant on Kodiak Island and probably are detrimental there as well as elsewhere to the salmon population, a series of marking experiments were initiated during the past year to furnish some information on the migrations, age, and growth rate of this species. Some of the chars were marked by excising two of their fins; others by insertion of a numbered metal tag in the body cavity and excision of the adipose fin so that they could be easily identified when recaptured. Three experiments were started at Karluk and two at Red River, a stream entering Shelikof Straits about 35 miles south of Karluk. In the Karluk experiments chars were marked in the Karluk River during their migration to and from the ocean and in Karluk Lake. In the Red River experiments chars were marked during their upstream and downstream migration.

Fish from only the first experiment of each series (those on downstream migrants) have been recaptured to date, but recoveries will probably continue for 2 or 3 years. The information obtained from these experiments to date is as follows:

1. Of the chars marked at Karluk in June as they were migrating to the ocean, over 12 percent were recaptured between July 17 and September 9, while on their return migration upstream. Of the chars marked in the first Red River experiment 18 percent were recaptured between July 12 and August 18 as they were migrating upstream. Thus, an appreciable percentage of the chars which migrated to the ocean in the spring returned to their home-stream in the fall of the same year.

2. Marked chars from the Karluk experiments were recaptured in salmon traps in the vicinity of Uganik Island over 45 miles away from the point of tagging and marked chars from the Red River experiments were recaptured in Uyak Bay over 60 miles from the point of tagging. These data show that after entering the ocean some of the chars wander a considerable distance away from their home stream.

3. That some straying of chars from one stream to another occurs was proven by the recovery of Karluk marked fish at Red River (5 percent of the total recoveries) and Red River marked fish at Karluk (0.6 percent of the total recoveries). Because of differences in fishing regulations, the difference in the amount of straying may not be as great as the figures indicate. Fishing operations are carried on as close to the Karluk River as 100 yards, whereas fishing is prohibited within 1 mile of Red River.

4. These fish grow very slowly during the time spent in the ocean. Although many of the Karluk and Red River chars attain the same length as red salmon, the latter, when in the ocean, grow approximately 6 centimeters (2⅜ inches) a month during June, July, and August,

while data obtained from the marking experiments indicate that the chars grow only about one centimeter a month during this period. Hence, it appears that these fish have a relatively long life span, a supposition which is, in a measure, confirmed by the otolith readings.

Both scales and otoliths have been examined and it has been found that the scales are virtually useless as a means of age determination, and that the otoliths, while of some value, are not altogether satisfactory. This difficulty makes the study of the life history much more complicated and other methods of age determination are being tried.

At Karluk Lake it was noted that chars take a very heavy toll of red salmon fry in the spring at the time the young fish are entering the lake from the spawning streams. However, during the summer and fall relatively little damage is done to the salmon populations by these chars. They have been caught by means of seines and gill nets, and only rarely was one found that had been feeding on salmon fingerlings. Although salmon eggs do comprise a large part of the diet of these fish, it was noted that the chars were feeding almost entirely on floating eggs displaced by the spawning activities of the salmon and these eggs would die whether they were eaten or not. An analysis of stomach contents of chars in Karluk River showed that the chars in the river were not feeding on seaward migrants.

PINK SALMON

The pink salmon investigation in southeastern Alaska was continued in 1937 by Dr. F. A. Davidson and Samuel J. Hutchinson. The investigation, as in the past, covered numerous pink salmon research problems. Activities were about equally divided between the summer field work in Alaska and the compilation of scientific data at the laboratory in Seattle. The summer field station at Little Port Walter, Alaska, was operated for its fourth consecutive year, remaining in active operation throughout the summer from May 20 to September 20.

The runs of pink salmon in southeastern Alaska during the 1937 season were comparatively light in practically all districts. The total pack of canned salmon was below average but the proportionate take of the total population was as great, if not greater, than in previous years. Catch statistics and studies of escapements into the streams for each district show that in the majority of cases the spawners were insufficient in number to make adequate use of all the available spawning ground afforded throughout the region. In 1937, the rainfall was in excess and most streams provided suitable water conditions for that portion of the population that successfully escaped the intensive commercial fishery.

All through Alaska the trend is toward cannery modernization and increased capacity. As a result the amount of fishing gear is expanding in an effort to increase the take of raw material. It is clear that the saturation point has been reached in all districts in southeastern Alaska and that the industry must, to maintain itself, be content with a smaller average pack per plant if it is to continue in the future. The problem facing the production of salmon in Alaska is nothing more than a farming problem. Seed must be planted if a crop is to be produced, and part of the crop produced must be conserved for seed. The spawning grounds are of limited size, tending to decrease rather than increase, thus making it impractical to think of the salmon resources as an ever increasing commodity.

No tagging experiments were conducted in southeastern Alaska during the summer of 1937, owing to the lack of suitable equipment and funds. The returns from the 1935 and 1936 taggings were studied and a detailed report has been submitted showing the migration routes of pink salmon through Clarence Strait and adjoining waters. It is shown that fish tagged at various time intervals during the spawning migration are bound for widely separated areas. Knowledge of this change in migration as the season progresses provides an explanation of the seasonal shift in the fishery and therefore aids in the establishment of the various boundaries for each district. This tagging report covers both the odd and even year groups and indicates the peculiar migration characteristics of each population.

Weir counts taken at Little Port Walter this year gave the second set of returns from a known even-year escapement and the first returns from a known odd-year escapement. A total of 7,085 pink salmon from the 1935 spawning population were counted through the weir from August 16 to September 10. Previous weir count totals consisted of 6,952 pink salmon in 1934, 6,073 in 1935, 5,164 in 1936, and 7,085 in 1937. The 1937 escapement is a 17 percent increase over the 1935 spawning population, while the 1936 returns were a 26 percent decrease under the 1934 population. Causes for such fluctuations can only be determined through a study of natural and imposed mortality from one point in the life cycle to the corresponding point in the life cycle of the following generation.

The sex of the individuals composing the run was determined as the salmon passed through the weir. This was accomplished with the aid of a specially constructed pen just above the counting gate which enables the observer to determine and record the sex of the individual fish as they pass through. In this stream males predominate at the beginning of the season, the ratio in some days running as high as 90 percent. This excess of males continues until the run is about three-fourths complete at which time the ratio stands at 2 to 1. During the last quarter of the run the females increase in abundance to such an extent that the ratio of sexes for the season as a whole is balanced. Factors influencing sexual development were observed throughout the season and actual weights of the gonads were taken at various intervals to determine percentage change in weight of sexual products over body weight.

Egg counts were taken to determine the average egg deposition that could be expected for the 1937 run. The average number of eggs produced per female in 1937 was 2,059, which resulted in the deposition of approximately 7,293,000 eggs in the gravel beds of the stream.

Three samples of the run were taken during the season for racial analysis measurements. From 26 body measurements taken from each individual a number of comparisons are made to determine the significance of individual variation. The continuation of racial analysis is expected to provide a method of segregation of various populations which will aid in formulating regulatory measures for future conservation.

Cooperative work with the National Canners Association of Seattle, Wash., carried on for the third consecutive season at the station, consisted of a study of the physical and chemical changes occurring in the pink salmon run at Little Port Walter. Daily

samples of pink salmon taken from the experimental trap in the bay were weighed, measured, and a proportional cut from each fish was canned. The canned samples have been turned over to the National Canners' Association for tests to determine the chemical changes that take place as the season progresses and as the salmon near sexual maturity.

A cooperative observer's meteorological record was maintained at Little Port Walter to secure information on a number of weather conditions that are important elements in the salmon's environment. A monthly average of 18.16 inches of rain fell at Little Port Walter during 1937, making a total of 217.90 inches for the year. Rain was recorded on 248 days. It is not known whether this is an excess as the weather station has only been in operation for the past year and a half. The highest air temperature for the year was 72° F., and the lowest was 16° F., with a yearly mean average of 42.73° F., 58 clear days, 94 partly cloudy, and 213 cloudy days were noted at the station during the past year.

A paper, "The Geographic Distribution and Environmental Limitations of the Pacific Salmon," embodying discussions of factors coincident with the native and foreign distribution of the Pacific salmon was completed and submitted for publication. In every instance where transplantations have been successful the conditions throughout the new habitat have been similar to those in the native waters, thus indicating that a thorough knowledge of the environmental conditions of a proposed habitat is essential before transplantations of the Pacific salmon into foreign waters are attempted.

ALASKA SALMON STATISTICS

Collection and compilation of daily catch records from the various types of fishing gear operated by the salmon fishery in Alaska was continued in 1937 by L. S. Christey. With the continued assistance of a W. P. A. project initiated in 1936, a complete collection of all available catch records for the remaining fishing districts in Alaska has been accomplished. Along with past records all current records are collected and the files will be kept up to date in the future.

Compilation of these data consists mainly in determining average daily catches for each type of gear throughout each fishing season. This information gives an insight into the relative abundance of salmon in each of the fishing districts and any change which occurs in the date of appearance of the runs of salmon. During the past year the trap-catch records in both Prince William Sound and southeastern Alaska were compiled for all years on this basis. This information as in the past was used as a basis for recommending changes in the fishing regulations in Alaska in order to provide for the conservation of the salmon resources.

HERRING

Investigation of the herring fisheries of Alaska was continued in 1937 by E. H. Dahlgren. A temporary assistant was assigned to the recently expanded Prince William Sound and Kodiak districts during the fishing season to obtain data on the size and age composition of the runs in these areas and to bring up to date the statistics of these now important fisheries.

Continuing the migration studies, tagging was again carried on during the spring at the Sitka and Craig spawning areas, which are known to contribute the greatest supply of herring to the commercial catch. In this experiment approximately 14,000 individuals were marked at Sitka and 11,000 at Craig. The electronic detector was again operated in Southeastern Alaska for the recovery of tagged individuals and 113 recoveries were made during the season.

From these recoveries, together with others made in previous years, the migration habits of the commercially important populations have been established. It is evident that: (1) the fishery in the Cape Ommaney area, from which 60 to 95 percent of the total catch is made, draws almost exclusively from the population which spawns in the vicinity of Sitka; (2) the Warren Island fishery draws from an intermixture of the Craig and the Sitka populations, and a small influx of herring from minor spawning grounds south of Craig at least as far as Rose Inlet, approximately 40 miles south of the major spawning area; (3) the summer fishery conducted on the west coast of Kuiu Island, including Malmesbury, Tebenkof, and Pillar Bays, is composed, as is the Warren Island fishery, of herring from the Craig and Sitka spawning areas; (4) the Douglas Island fishery is supported by the Juneau spawning populations; and (5) the Icy Strait and Tenakee fisheries are composed of an intermixture of Juneau fish with some unknown population, most probably that of the Kootznahoo spawning area.

The herring in the Cape Ommaney fishing area from which the bulk of the commercial catch in southeastern Alaska is made, have shown a marked decline in abundance during the past few years. The measure used in evaluating this abundance is derived by a comparison of the catch per unit of gear per day's fishing with the average catch per day's fishing established over a 9-year period. In deriving these indices, the fleet has been divided into two groups (those of over 35 net tonnage capacity and those under this size) to minimize the effect of the difference in efficiency of the larger and smaller vessels.

The index for the 1937 season for the larger vessels was 71 compared with 73 for the 1936 season, 140 for the optimum year of 1932, and 62 for the minimum year of 1935. The indices for the vessels not over 35 net tons for 1937 was 75, compared with 60 for the minimum year of 1936 and 164 for the optimum year of 1932.

This continuing low level of abundance, while doubtless due in large measure to an overly intensive fishery, was brought about in part by the virtual failure of the three successive spawnings of 1932, 1933, and 1934, to contribute the normal increment of young fish to the populations. The entrance during the 1937 season of a large percentage of the new age class resulting from the more successful spawning of 1935 may be expected to result in a rise in the level of abundance. This year class, which appeared in large numbers as 2-year-olds in the 1937 catch, may be expected to contribute a large portion of the catch as 3-year-olds during the coming season.

The low catch per unit of gear in the Ommaney area during the 1937 season was due in part, also, to the emigration out of that area of the age group which had supported the fishery during the three previous years, the abundant 1931 year-class. Tagged individuals belonging to this age-class were taken in large numbers in the Teb-

enkof-Pillar Bay area on the west coast of Kuiu Island, increasing the catch in that area, but causing a lower catch in the Cape Ommaney region. Such differential schooling has been observed before, especially when, owing to the failure of a series of spawnings, the population is composed of age groups of marked size difference.

The fishery in the Kodiak area, originally developed for the curing of herring, was expanded in 1935 to one for reduction. With this change in the method of utilization there followed a change in the type and intensity of fishing activity—a change which has resulted in a tremendous increase in the poundage taken from this area. A similar change has occurred in the Prince William Sound district, although the shift from curing to reduction has been more gradual. Owing to limited personnel, adequate collection of data from these areas has lapsed during the past few years. With the rapid expansion of the fishery, however, it was deemed essential that records of the catch and of the size and age composition of the catch again be collected in order that signs of depletion might be detected before the fishery declines to the point of commercial extinction, as it did in these areas in early years.

PACIFIC PILCHARD INVESTIGATIONS

O. E. Sette, *in charge*

From relative insignificance in pre-war years, the fishery for the Pacific pilchard, also known as California sardine, (*Sardinops caerulea*) has grown to enormous proportions, a total catch of over 750,000 tons being landed in the season of 1936–37. This is a quantity three times as great as the annual landings of all other kinds of fish in the Pacific Coast States. Attending the expansion of this fishery has been the growth of public concern over the ability of the resource to provide such large catches without endangering the future supply. In California, where most of the catch is taken, this concern has been felt for a number of years and has been expressed in State regulations placing certain restrictions on the use of this fish for reduction to meal and oil. In offshore waters, beyond the 3-mile limit, floating reduction ships have operated without restrictions—a condition considered intolerable by shore operators and State authorities.

The seeking of Federal legislation intended to place the offshore operations under State jurisdiction brought Federal attention to the controversial situation in California. At the same time the legislatures of Washington and Oregon petitioned Congress for a Federal scientific investigation of the pilchard resource which was being fished with increasing vigor in the waters off their shores. As a result, the appropriations of the U. S. Bureau of Fisheries were increased to provide for a Pacific pilchard investigation. The funds became available July 1, 1937, and before the end of the year a staff headed by Oscar E. Sette was detailed to the investigation. The kindness of Stanford University in providing generous laboratory space has led to the establishment of headquarters at a point centrally located with respect to the fishery. Since this investigation lies in a field in which the several States, notably California, are conducting important research, their cooperation in formulating a program and in furnishing data has been of great value.

The first months of the investigation have been devoted to a preliminary reconnaissance of the problem. The basic questions are: (1) Do the fisheries of various localities draw upon one population or upon several self-perpetuating populations? (2) What intensity of fishing will provide the maximum yield of fish of greatest commercial value from each successful year-class? (3) What intensity of fishing will permit survival of a spawning stock adequate to produce successful year-classes?

The first question is being investigated by California, Oregon, Washington, and British Columbia, by the tagging method. It has already been proven that some individuals migrate long distances from Southern California to Washington and vice versa. Whether this represents a small percentage of mixing of the population along the entire coast remains to be seen. It is planned to study this aspect of the problem by discovering to what extent the young as well as the adults occur in the north and to make comparisons of morphological characters to see whether there are any distinguishing features between northern and southern pilchards.

The second and third questions are more perplexing and their answers more remote because they involve determination of age and of abundance. Satisfactory techniques have not yet been developed for either of these determinations. Accordingly work has started on developing a technique of age determination by interpreting age marks in hard structures, by observing modal progression in sizes of young pilchards, and by identifying modes in frequency distributions of the adult population; and on developing a technique of estimating abundance from catch statistics and by aerial observation of schools, or by a combination of the two methods.

Progress in the solution of these problems will be accelerated by cooperation with State fishery research units which have collected and kindly made available many pertinent data. A series of measurements based on samples collected from the commercial catch over a period of years by the California State Fisheries Laboratory is expected to be particularly useful in this connection.

Although the discovery of techniques of age and abundance determinations are prime essentials and will greatly advance the understanding of conservation problems, it must be pointed out that preservation of an adequate spawning reserve will require a quantitative determination of annual egg production in all potential spawning areas. This cannot be undertaken until a seagoing vessel is available to make periodic surveys in cooperation with such boats as the States have available for this purpose.

GREAT LAKES FISHERY INVESTIGATIONS

DR. JOHN VAN OOSTEN, *in charge*

The limited amount of field work conducted during 1937, permitted the Great Lakes staff to continue the compilation of extensive data collected in earlier years. In addition to the papers published by staff members during the year, several other manuscripts were prepared for publication. Among these was a report setting forth the results of an intensive study of the whitefish fishery of Lakes Huron and Michigan. This investigation was concerned es-

pecially with the effects of the deep trap net fishery on the abundance of whitefish in these two lakes.

Two important forward steps were made in Great Lakes fisheries administration during 1937. First, the adoption by Wisconsin, Illinois, Michigan, Ohio, and the Province of Ontario of the flexible rule method of measuring gill net meshes brought a troublesome problem to a satisfactory conclusion. The flexible rule provides an extremely accurate and impersonal method of determining the legality of gill net meshes. Earlier methods of gauging gill net twine were open to the criticism that the results obtained varied according to the procedure followed by the individual making the measurements. The second important advance in Great Lakes fishery administration was the passage of the "discretionary power" act by the Wisconsin Legislature. This law empowers the State conservation officials, after consultation with and on the advice of commercial fishermen, to enact commercial fisheries regulations by decree. As a result the conservation officials can meet emergency situations readily and are also in position to frame a rational long-time program for the rehabilitation of Wisconson's sadly depleted fisheries.

No significant advance can be claimed in the fundamental problem of obtaining uniform regulations for Great Lakes fisheries, nor does there appear to be much likelihood that adequate and uniform regulations can ever be attained through the medium of interstate agreement. The growing realization that satisfactory fisheries regulations cannot be attained by the united action of the States is reflected in a rising sentiment for the regulation of Great Lakes commercial fisheries by a Federal or international agency.

Active cooperation continued to mark the relationship of the Great Lakes staff with the State officials and with the fishing industry. Cooperative projects requiring field work were the gill net investigations on Lake Erie, the study of the effect of commercial fishing on the game fish in Potagannissing Bay, Lake Huron, and the general survey of the relationships between sport and commercial fishing in southern Lake Superior and northern Lakes Huron and Michigan. Dr. Van Oosten again issued numerous memoranda relative to Great Lakes fisheries problems, and on several occasions at the request of State officials aided in the framing of commercial fisheries regulations.

The Bureau is greatly indebted to the University of Michigan for laboratory space, and for numerous other accommodations and courtesies extended to the staff.

FISHERY STATISTICS

A complete analysis, by methods outlined in previous reports, was made of the 1936 statistics of the commercial fisheries of Great Lakes waters under the jurisdiction of the State of Michigan. There are now available detailed records of fluctuations in fishing intensity and in the production and abundance of the important commercial species over an 8-year period (1929–1936) for each of the 22 fishing areas or statistical districts into which the State of Michigan waters have been divided. The statistical data on the whitefish in Lakes Huron and Michigan proved of great value in the study of the whitefish fisheries of these lakes completed by staff members during the year.

AGE AND GROWTH STUDIES

Lake Erie sheepshead.—An investigation of the Lake Erie sheepshead (*Aplodinotus grunniens*) by Dr. Van Oosten included data on growth rate, growth compensation, the age and year-class composition of the stock, the relationship of total and standard length, the length-weight relationship, and the coefficient of condition. Although one fish in its thirteenth year and another in at least its seventeenth year (this latter fish was 27.2 inches long) were found, the bulk of the collection was made up of young fish. The dominant age-group was the I-group (1926 year-class) with an average length of 8.6 inches.

Other facts brought out were: growth compensation occurs in the sheepshead; the ratio, standard length in total length, decreases with growth; the coefficient of condition increases with age but is not correlated with growth rate.

Lake Erie yellow perch.—The investigation of the life history of the yellow perch (*Perca flavescens*) of Lake Erie, suspended in 1935, was resumed in August 1937, upon the return of Frank W. Jobes to the Great Lakes staff. The preparation of a manuscript dealing with the age and growth of the yellow perch in Lake Erie is now under way. The comparison of the growth of the sexes in the yellow perch reveals an unusual situation. In the first year of life the males grow more rapidly than the females, but in all later years the females have the better growth.

An integral part of the growth study is the examination of the body-scale relationship as determined from measurements of selected or "key" scales. From the preliminary tabulation of the material it appears doubtful whether any simple mathematical formula can be employed in the calculation of the growth of the Lake Erie yellow perch. The use of a purely empirical curve of the body-scale relationship may prove necessary.

The coefficient of condition was found to vary according to locality and season. Sex differences occur only in the spawning season at which time the females have distinctly the higher coefficient. The study of season variation revealed that condition is best during the summer.

Lake Erie whitefish.—After a lapse of several years the study of the Lake Erie whitefish (*Coregonus clupeaformis*) has been resumed. All scales have now been read and measured, and the individual growth histories calculated. Data relative to the various phases of the life history of the Lake Erie whitefish have been compiled in tabular form preparatory to writing a report on this subject.

FOOD OF LAKE MICHIGAN LAKE TROUT AND LAWYERS

A report on the quantitative and qualitative analysis of the contents of 4,979 lake trout (*Cristivomer namaycush*) stomachs and of 1,528 lawyer (*Lota maculosa*) stomachs was completed by Drs. Van Oosten and H. J. Deason. The food of the trout consisted of 98 percent by volume of fish of which Cottidae and Coregonidae were the principal constituents. Cottidae were dominant in southern Lake Michigan (72 percent by volume), Coregonidae in northern Lake Michigan (51 percent), but the lake shiner (*Notropis atherinoides*) was most im-

portant in Green Bay in the spring of the year (64 percent). The lawyer food consisted of 74 percent by volume of fish and 26 percent invertebrates. Dominant items were Cottidae (76 percent by volume) in southern Lake Michigan, Coregonidae (51 percent) and *Pontoporeia* (37 percent) in northern Lake Michigan, and *Percopsis* (34 percent) and *Mysis* (26 percent) in Green Bay. Data were also obtained on the frequency of occurrence of the food items, variation of food with the size of the predator, depth of water, season, and locality; on the number of individual fish of each species destroyed by trout and lawyers; and on the calculated volume of food preceding digestion. The lake trout and lawyers are competitors for the same food, and are both predators of the commercially important Coregonidae. The lawyer through its consumption of invertebrates is also a food competitor of the Coregonidae.

The large number of Cottidae secured from the lake trout and lawyer stomachs made possible a report on the distribution of three species. *Cottus cognatus*, *Cottus ricei*, and *Triglopsis thompsonii* in Lake Michigan. The number of records previously published from Lake Michigan was surprisingly small because these species are only rarely taken by commercial fishing gear.

SPECIAL SURVEYS

Potagannissing Bay Investigation.—The repeated insistence by sport fishing interests that commercial fishing operations should be prohibited in the Potagannissing Bay area of northern Lake Huron in order to protect game fish led to the passage of a resolution by the Michigan State Senate requesting the Michigan Conservation Commission and a representative of the United States Bureau of Fisheries to conduct an exhaustive survey of the fishery conditions in that region. A preliminary survey was made by Dr. Van Oosten and Fred Westerman of the Michigan Conservation Department from May 28 to June 2. A program of weekly sampling was instituted and was carried on by conservation officers, to determine the species composition of commercial trap net catches and particularly to ascertain how extensively game fish, especially black bass, occur in these nets. Subsequent visits to check the progress of the investigation and to amend the program were made by Bureau representatives during the periods from July 16 to 21 and August 6 to 10. The investigation will be continued throughout the winter season. Following an analysis of the data, recommendations for the regulation of the fisheries of the area will be formulated.

Lake Erie gill net investigation.—In August 1936, the gill net fishermen operating in the State of Ohio waters of Lake Erie secured a court injunction which restrained the Conservation Department from enforcing the law regulating the size of mesh in small-mesh nets. The fishermen held that their admittedly illegal nets were not catching more illegal fish than the 10 percent permitted by law. At the request of the Ohio Conservation Department and the Ohio Gill Netters Association an agreement was made on March 31, 1937, that provided for an investigation by the United States Bureau of Fisheries. Dr. Deason was in the field from April 7 to May 6 and from October 21 to November 6 collecting data on the relationship of the size of blue pike-perch, yellow perch, and saugers and the volume of

the catch to the size of the net mesh. The mesh sizes of the nets studied ranged from $2\frac{5}{8}$ to $2\frac{15}{16}$ inches. On the basis of the 1937 and earlier (1927–28) gill net studies, the Bureau will recommend a definite mesh size for gill nets used for all species commonly taken in small-meshed nets, and will recommend also an upward revision of the present legal size limits for blue pike-perch and saugers in order to provide better protection for spawning females. It is not anticipated that the recommendations will differ materially from those made by the Bureau at an earlier date.

Another phase of the gill net investigations was the experimental study of the shrinkage of gill net twine. The adoption of the flexible steel rule, developed by the National Bureau of Standards, and the further legal provision that net mesh must measure full size at all times, whether new or old, wet or dry, caused considerable controversy over the allowance which should be made for shrinkage in ordering new netting. At the request of the fishermen, who provided the necessary materials, experiments are being conducted to determine the maximum shrinkage, rate of shrinkage, and the relative importance of water and of several preservatives in inducing shrinkage.

The differences among various methods of measuring gill-net meshes (stretched measure, 1 pound strain on 1 mesh, 1 pound strain on 3 meshes, 8 ounce strain on 1 mesh, and National Bureau of Standards flexible rule) are being determined experimentally. This information will be submitted to the fishermen and conservation officials of those Great Lakes States that have recently adopted the flexible rule as the legal method for determining the size of gill nets.

SHELLFISH INVESTIGATIONS

DR. PAUL S. GALTSOFF, *in charge*

Oyster fishing continues to occupy a prominent position among the fishery industries of the country in spite of serious handicaps caused by the ever increasing depletion of natural oyster beds, destruction of valuable oyster bottoms by pollution, and depredations by natural enemies of the oyster. Dissemination of knowledge regarding the life history of the oyster has resulted in wider recognition of the fact that a system of oyster cultivation is necessary for maintaining the productivity of present resources.

Since success in the cultivation of oysters depends on knowledge of local conditions and good judgment in applying to them the basic principles of oyster culture, the shellfish investigations of the Bureau of Fisheries are conducted along the following lines: physiological studies, dealing primarily with the propagation and nutrition of oysters; ecological investigations, which provide answers to questions regarding the suitability of various waters to oyster culture; protection of oyster bottoms against starfish and other enemies; and investigations of the effect of trade wastes on oyster bottoms.

The first line of attack supplies the basic knowledge concerning the requirements and activities of the oyster which is essential for the practical oyster grower. Ecological observations made in 1937 in Long Island Sound and in the inshore waters of Virginia, North Carolina, Alabama, and Florida have been of great value to State authorities and private oyster organizations in transplanting seed

and planting shells. Studies in the life history and distribution of the starfish disclose the inadequacy of present methods of control and demonstrate that in Long Island Sound control is an interstate problem. Experiments with the use of chemicals in the eradication of starfish are very promising and indicate that chemical control may soon be put on a practical basis. The work on pulp mill pollution provides convincing evidence of the toxicity of pulp mill effluent with the result that practical steps are being undertaken by interested parties to abate this hazard.

PHYSIOLOGY OF THE OYSTER

Physiological investigations on the oyster were carried out by Dr. Galtsoff and staff at the Woods Hole, Mass., laboratory. Studies were continued on sex changes in adult oysters, accumulation and storage of iron in oyster tissues, and the effect of industrial pollution on respiration.

Sex changes.—The work on sex change was undertaken with the view of obtaining additional evidence of sex reversal in adult oysters. Methods used by previous investigators are open to criticism. The method of comparing sex ratios of oyster populations is obviously inadequate where both types of change—from male to female and from female to male—are involved. The method of examining the gonads of living mollusks through holes bored in the shell is objectionable because of the unknown effect of injury on the presumably unstable gonad of the mollusk.

The method used in this investigation consisted in determining the sex of the oyster by inducing ovulation or ejaculation by increased temperature and chemical stimulation (Galtsoff, 1930, Proc. Nat. Acad. Sci., 16, No. 9, pp. 555–559). Of each of the 202 adult oysters tested at Woods Hole during the summer of 1936 an individual record of the spawning reaction was obtained and the discharged products were examined under a microscope. Each oyster was then measured and marked by engraving a number on its right shell. Elaborate precautions were taken to avoid any possibility of mismarking. Oysters were then transferred to Milford, Conn., where they were kept in large tidal tanks.

During the summer of 1937, the sex of these marked oysters was redetermined by the same method used in 1936. It was found that 9.7 percent of the oysters had reversed their sex. The percentage of reversals was considerably higher among females (13.1 percent) than among males (8.0 percent). The mortality during the year was only 7.04 percent, probably a normal death rate among adult oysters.

As previous observations by Dr. Galtsoff have shown, ovulation of the female is accompanied by typical rhythmical contractions of the adductor muscle and passage of eggs through the gills, while in the male ejaculation proceeds through the cloaca and does not involve specific behavior of the adductor. In the sex reversed males the physiological set-up of the organism changes with the change of sex and a typical female reaction develops. In several instances, however, the development of this reaction lagged, the newly formed female still acting as a male by discharging eggs through the cloaca and failing to develop rhythmical contractions of the adductor. Its kymograph record could easily have been mistaken for a male re-

action. A month later a typical female reaction was fully established. Another sex reversed male had a fully developed muscular reaction but the discharge of eggs continued through the cloaca, indicating a deficiency in the mechanism which forces eggs through the gills. All sex reversed females reacted as true males. From these observations the conclusion is reached that the female reaction has developed as a secondary adaptation which provides a mechanism for the dispersal of eggs through the water. The male reaction is regarded as a primary sex reaction of the oyster.

A hermaphroditic oyster found among a group of new oysters tested during the summer had an atypical reaction possessing the characteristics of both sexes. This oyster discharged both eggs and sperm and was capable of self fertilization.

Present observations which establish a sex reversal in adult oysters occurring simultaneously in both sexes can be explained by assuming that the changes of the fundamentally bisexual gonad of *Ostrea virginica* are controlled by some hormonic system in which the development of one sex or another is inhibited. Whether these changes are hereditary characters which occur only in a certain group of individuals remains to be demonstrated by further observations. Since abnormal sex ratios have been observed in adult oysters grown on natural bottoms, understanding of the factors controlling the change of sex is of obvious practical significance to breeders and may be valuable for the maintenance of spawning grounds.

Accumulation and storage of iron.—The possibility of increasing the iron content of oysters by keeping them in water to which iron oxide was added was demonstrated in a series of experiments conducted in the laboratory at Woods Hole and in tidal tanks at Milford. In the latter place iron was added to sea water by suspending several pounds of nails in bags. There was considerable discoloration of the water due to the presence of suspended particles of iron hydroxide, but there was no material increase in the amount of iron in solution. In several instances upon the addition of iron oxide the amount of iron in solution even decreased. The accumulation of iron in the tissues of the oyster gradually increased, however, rising during a 6-month period from about 150 mg to more than 1,000 mg of iron per kilo of dry meat. Histological analyses proved that iron oxide particles are absorbed by the blood cells of the gills and are carried away and stored in the mantle and in the anterior part of the body.

Effect of industrial pollution on respiration.—Suspecting that phenol salts may be the toxic substances of pulp mill waste which affect the oysters, a study was made of the effect of pure phenol on respiration. Using the technique developed in previous years the oxygen consumption of the oyster was measured under normal conditions and in water containing phenol in concentrations 1:20,000; 1:1,000 and 1:500. The results show no significant changes in the rate of respiration in the presence of this substance.

OYSTER CULTURAL STUDIES

Prediction of spawning and setting in Long Island Sound.—The development of methods for accurately predicting the time and intensity of setting of oysters in Long Island Sound was one of the prin-

cipal investigations carried out at the Milford, Conn., laboratory by Dr. V. L. Loosanoff and James B. Engle. To obtain a broader knowledge of conditions governing the survival of oysters in the Sound and its tributaries, a study of the physical and biological factors was undertaken on a much larger scale than had been carried out during previous years.

For observations on temperature, salinity, conditions of oyster gonads, presence of larvae in the water and their setting at various depths, 23 stations were established in Long Island Sound proper from a point opposite the mouth of Saugatuck River in the west to Joshua Point in the east. All these stations were visited every week during the spawning and setting season.

Regardless of the fact that much work on the biology of the oyster has been carried on in local waters, no attempt has ever been made to conduct a systematic study of oyster setting in Long Island Sound proper. To fill this gap it was decided to determine the beginning and end of the setting period, the intensity of setting throughout this period, the intensity in relation to depth, the correlation between setting and the temperatures and salinity of water, and finally, the rate of survival of recently set oysters in different parts and in different depths of Long Island Sound. For these studies two oyster-seed producing areas located about 5 miles apart were chosen. The so-called Stratford Point area represented the natural oyster beds where little or no cultivation of oysters is carried on. Welch's Point area, on the other hand, was located in the center of cultivated grounds. In the studies of setting in each area, wire bag collectors of uniform size and containing approximately the same number of shells were used. The bags were removed from the water at semiweekly intervals and replaced by unused duplicates.

From the analysis of this year's observations as well as from the information already in the files of the station it may be concluded that the salinity of bottom water, which is subject to only slight seasonal changes throughout the year and remains virtually the same from year to year, is not a factor responsible for the success or failure of spawning and setting of oysters in the Sound. It was also noted that during the summer of 1937 spawning occurred at a temperature of less than 20.0° C. (68° F.) which had been regarded previously as the minimum temperature required to induce this act under natural conditions. The first and general spawning of oysters in the Sound took place on July 2 and 3. It was followed by a setting which was first recorded on July 17. Subsequent heavy settings in July and early August continued without interruption for 3 weeks. The last and rather light setting occurred on September 20. Examinations of spat collectors disclosed that setting took place from mean low water to a depth of 70 feet, but was heavier in shallow water. The first set in some places amounted to 10,000 spat per bushel, but mortality caused by attacks of starfish and drills ranged from 93 to 100 percent.

To assist the oyster growers of Long Island Sound in obtaining the best set, information accumulated by the laboratory staff was summarized and issued in weekly bulletins which were distributed through the cooperation of the Connecticut Shellfisheries Commission. The bulletins contained statements regarding the condition of oysters, changes in water temperature, and expected time of spawning and

setting. A large number of oystermen availed themselves of the opportunity to obtain these data and used them to advantage by planting shells at the proper time and place. It is planned to continue this practice and if possible to extend it to a larger area.

Control of starfish.—Observations on propagation and feeding of starfish in Long Island Sound were continued. The fact that starfish were responsible for the destruction of the greater part of the early oyster set in the summer of 1937 clearly demonstrates the importance of these studies for their control. It was found that starfish spawned on or about June 15 at a temperature of 15.0° C. (59° F.). Setting began on July 7–8, and continued until September 20. The heaviest setting occurred from the middle of July until the middle of August. As in the case of the oyster spat, the newly set starfish were more abundant in shallow water although setting took place at all the depths from low water mark to 70 feet.

Experiments on chemotropism of starfish were concluded in the fall of 1937. These experiments sustained the conclusions arrived at in 1936, when the largest part of the experimental work was done, that the chemical sense of starfish is poorly developed. Usually a starfish does not detect the presence of food until it comes in actual contact with it.

It has been the general practice of oystermen to use boiling water or steam to kill starfish brought up by mops, an expensive procedure because of the large quantities of fuel used to maintain water at the boiling point. In the belief that water of much lower temperature would kill starfish, a series of experiments was undertaken to determine the minimum lethal temperature for these animals. It was found that a temperature of 50° C. (122° F.) was sufficient to kill the starfish and that the use of boiling water is therefore unnecessary.

Although it is well known that starfish do not occur in water of low salinity, the limits of tolerance for this species have not been determined with accuracy. Experiments undertaken to provide this information disclosed considerable individual variations in the ability of starfish to withstand brackish water. When subjected to a salinity of 14.00 parts per thousand some of the starfish died in 3 days while others survived 13 days. The limit of tolerance is probably around 16.00 parts per thousand, for in this dilution of sea water some animals were kept alive 2 months.

At the request of Virginia oystermen a survey of the distribution and abundance of starfish in the lower Chesapeake Bay was made in March. The investigation revealed that starfish were confined to the area south of a line drawn from New Point Comfort to Cherrystone Island. The largest concentration was found near York Spit Light. Other areas of heavy infestation were found 3 miles southeast from Back River, 3 miles north of Little Creek, and in the vicinity of Old Plantation Light. The starfish population was not uniformly distributed, being on muddy bottoms where there was an abundant supply of small clams, *Mulinia lateralis*, upon which they were feeding. No starfish were found on oyster bottoms located in the areas of low salinity. In April, with the rise of water in the rivers emptying into the Chesapeake Bay, the starfish population withdrew toward the mouth of the Bay.

Effect of pulp mill pollution on oysters.—At Yorktown, Va., Dr. Walter A. Chipman, R. O. Smith, and L. L. Garriss were engaged in investigating the cause of the decline in oyster production in the York River. Studies of the effects of pulp mill pollution on oysters are an important part of this investigation.

Confirming the results obtained in 1935 and 1936, observations made during this year showed that oysters in the York River below Claybank were healthy and marketable, while those above that point were extremely poor and unfit for market. The shells of the upper York River oysters are much thinner than those of the lower York River oysters and the meats are much more watery. The oysters of the Piankatank River which are studied for purposes of comparison were found to be in excellent condition. Chemical tests of the glycogen content bear out the observational data. During the year the fluctuations in the glycogen content of the three groups of oysters were as follows: Upper York River, 1.65–1.88 percent; Lower York River, 2.65–5.28 percent; Upper Piankatank River, 2.97–5.44 percent.

Remarkable improvement was found in the condition of oysters transplanted from beds in the upper York River to other localities. The shells were strengthened by deposition of lime, the meats "fattened," and the green color of the meats had disappeared.

Additional samples of oysters were taken this year from various parts of the York and Piankatank Rivers and from other areas throughout the lower part of Chesapeake Bay for a study of the distribution of *Nematopsis*, a gregarine parasite known to infest oyster tissues. It was found that the parasite infestation was quite general and that oysters from many areas containing good marketable oysters were infested, indicating that the poor condition of the upper York River oysters could not be attributed solely to parasite infestation.

The hydrographical conditions of the York and Piankatank Rivers were observed regularly throughout the year following the same general program described in Progress in Biological Inquiries for 1936. Measurement of current velocities and of the tide in the upper York River was completed. Analysis of the completed data indicates that there is little nontidal current (average 0.04 knot downstream) and that the York River is primarily an estuary. It was found that the mean range of tide at West Point was 3.0 feet.

Comparative chemical analyses of the three main effluents of the pulp mill at West Point disclosed considerable difference in the amount of phenols, total solids, and biochemical oxygen demand of the three effluents.

In view of the fact that it is impossible for the oyster to feed during the time the shell is held closed, observations were made of the hours per day that oysters remained open in various localities. The oysters kept in the river were connected to recorders and their activities under natural conditions observed. It was found that the oysters of the upper York River were not open as many hours per day as the oysters of the lower part of the river, the averages being 15.28 hours per day for the upper York and 20.81 hours per day for the lower York.

Physiological experiments consisted of studies of the effects of pulp mill effluents on the respiration and feeding of oysters. Continuous records of the pumping activity of oysters show marked reductions in the amount of water pumped in concentrations of 1 part per thousand or stronger of liquor from the diffuser building.

Studies employing the carmine cone and drop counting methods of measuring the ciliary activity of oysters showed that very dilute concentrations of the effluent from the diffuser building brought about depression in ciliary motion. In some instances concentrations as low as 1 part in 4,000 of the effluent in sea water reduced the rate of flow after exposure of 2 to 4 hours.

Using the drop counting method additional experiments were performed at Woods Hole, Mass. Employing the oysters and sea water of this region results were obtained showing reductions in rate of pumping when diffuser building liquor was added to the water supplied to the oysters. The reductions observed were similar to those found at Yorktown with the oysters and sea water of that region. It was also found from tests at Solomons Island, Md., and Beaufort, N. C., that the reductions in rate of flow of water through the oysters caused by the addition of pulp mill effluents were essentially the same as in the experiments carried on at Yorktown. These experiments were completed by the carmine cone technique.

Comparative studies of the physiological effects of the three main sewer outlets of the pulp and paper mill at West Point on oysters show that the most toxic is the effluent from the diffuser building; the next place is occupied by the paper mill effluent, while the discharge of the sludge pond is least toxic.

Tests with dried and ashed effluent of the diffuser building indicate that the material causing reduction in the rate of pumping by oysters is organic, for drying at low temperature and then redissolving in water materially decreases its toxicity. It was indicated by a series of experiments that aeration of the effluent for a month did not appreciably alter its toxicity. This is of particular interest since ponding of the effluent for slow oxidation is the plan of a new pulp mill being put into operation at Franklin, Va., in its endeavor to render the waste nontoxic to aquatic life.

The effects on oysters of fractions of the effluent and pure compounds known to occur in pulp mill wastes were tested to determine the active material of the effluent. Incomplete results indicate that the turpentine condensate resulting from the recovery of turpentine from the liquor is not particularly toxic to the oyster, nor was pure phenol under the experimental conditions employed. Observations on phenol salts, resins, and soaps are being continued.

Field and laboratory investigations have demonstrated that pulp mill effluent is toxic to oysters and that its discharge into the York River is primarily responsible for the decline of the oyster industry in this area.

Studies on the sporozoan parasite of the oyster.—Studies on the sporozoan parasite of the oyster which is very generally distributed in coastal regions from Maryland and Virginia to Louisiana were continued by Dr. H. F. Prytherch at Beaufort, N. C. Spores of this parasite were found in the tissues of the muscle, gills, and mantle, the number per oyster frequently amounting to several million. The

mature spore (length 20μ diameter 11μ) contains a single vermiform sporozoite folded twice on itself and is the resting or final developmental stage in the oyster.

Under natural and laboratory conditions the hatching of the spores takes place in the intestine of the common mud crabs, *Panopeus herbsti* and *Eurypanopeus depressus* after these hosts have fed on infected oyster meats. After undergoing a cycle of development in the crustacean host, the parasite reaches an infective or gymnospore stage, which is released into the water and may be carried within the shell of the oyster by the feeding current.

Experiments with vitally stained gymnospores show that they attach to and penetrate the epithelium of the oyster gill by means of a pseudopod projected from the central cell. Later stages may be picked up by phagocytes and transported in the circulatory system to nearly all parts of the body. With the formation of heavy, double-walled sporocysts, the parasite has reached the characteristic resting or dissemination stage commonly found in *Ostrea virginica* and various other members of the same class of mollusks. Further details of the life history of this sporozoan will be published shortly in a scientific journal.

Studies of the effect of the parasite on adult oysters were conducted in the laboratory where heavy infections could be produced. In bulk experiments with several hundred oysters, losses of 66 to 73 percent resulted over a period of 3 months. Kymograph records of shell movement of heavily infected oysters showed abnormal and frequent contractions of the adductor muscle followed by loss of holding power and death of the mollusks. The injury to the oyster host may be due to a toxin given off by the developing sporozoites, particularly in the sensitive mantle tissue, or to actual physical obstruction of the circulation by the masses of enlarged, infected phagocytes found in the blood vessels of the gills and muscle.

Practical prevention of the infection of oysters by this parasite is possible by control of the primary hosts, the mud crabs. The crabs do not migrate and can easily be removed, before the beds are planted, by the use of dredges or scrapes equipped with fine mesh bags. The possibility of destroying the crabs by chemicals such as copper salts, chlorines, etc., is at present under investigation.

Investigations in Florida.—An experimental study of spawning and setting of oysters in Apalachicola Bay, Fla., was begun early in the spring by Dr. A. E. Hopkins. Because of the warm winter many oysters retained fully matured eggs or sperms in the gonads. Of samples taken early in March from St. Vincent Sound and Indian Lagoon, about half were mature. In the eastern portion of the bay, where the most extensive natural bars are located, only an occasional sexually mature individual was found. A month later, in early April, almost all specimens contained mature sex products. However, there was no indication of spawning until the end of April and the first of May, although for sometime previously the water temperature had been in general above 20° C. Spawning did not occur throughout the entire population at once but apparently involved only a small number of individuals at a time. A scattered set of seeds was obtained on bags of shells beginning at the end of May and continuing throughout the summer.

Tests were begun to determine the amount of meat present in oysters from different grounds with reference to the inside volume of the shells. The relative size of the shell cavity varies widely in oysters on different grounds. The volume of the shell cavity in relation to total volume is expressed as $\frac{100 \times \text{volume of cavity}}{\text{Total volume}}$

Total volume refers to the displacement of the entire oyster with shells intact but free from adhering organisms.

Each natural reef appears to be distinctive in the type of oysters produced. For some of the reefs in Apalachicola Bay values ranging from 30.82 percent to 41.83 percent were obtained. (Japanese oysters grown in the State of Washington average 52.64 percent inside cavity.) The volume of the cavity of the shell constitutes a limit to which the meats may develop, but it is important to note that the best meats do not necessarily come from the shells with the largest proportion of cavity.

Oyster meats were dried at 100° C., and the dry weight determined with reference to the volume of the shell cavities in which they lived. The following values, expressed as

$$\frac{100 \text{ x dry wt. in grams}}{\text{Volume of cavity in c. c.}}$$

represent the average of 20 to 25 specimens from each ground early in March before spawning had begun: St. Vincent Sound (transplants), 9.048; Indian Lagoon, 11.080; Cat Point, 4.337; Porters Bar, 10.863; Picoline Bar, 9.359; Platform Bar, 5.009; St. Vincent Bar, 4.666; Peanut Patch Bar, 3.745. Oysters from East St. Andrews Bay averaged 6.125 while Japanese oysters from Washington State averaged 11.732. Analyses of this type are being continued in conjunction with observations on hydrographical factors such as temperature, salinity, and pH of the water, abundance of plankton, degree of development of gonads, and spawning, in order to determine the conditions under which the best quality meats may be produced.

On account of unfavorable variations in salinity and turbidity of the sea water at the temporary laboratory at Indian Pass, near Apalachicola, Fla., headquarters for investigations were moved to the Pensacola Bay region. The Pensacola Quarantine Station of the Public Health Service was transferred to the Bureau of Fisheries for use as a laboratory. The main building has been equipped with running sea water and other necessities. The location is most favorable for oyster investigations, being within a short distance of the extensive oyster grounds of Florida, Alabama, Mississippi, and Louisiana, and having a supply of clear, clean sea water for laboratory investigations.

SPECIAL SURVEYS

Effect of dredging operations in Buzzards Bay.—At the request of the U. S. Engineer's Office, a special survey of oyster beds in Buzzards Bay was made by Dr. Loosanoff with the view of determining the condition of oysters and bottoms in the vicinity of the dredging operations performed by the War Department at the en-

trance to the Cape Cod Canal. Detailed information was supplied to the Engineer's Office as a result of this survey.

Survey of oyster bottoms in Shinnecock Bay, Long Island.—At the request of C. E. Dimon, secretary of the Board of Trustees of the town of Southampton, Long Island, N. Y., Dr. Loosanoff was detailed to study the conditions responsible for the disappearance of oysters.

It appears from the two surveys carried out in July and October in Shinnecock Bay, that the largest part of this once productive public oyster bottom is at present either much depleted or entirely barren. Studies of conditions existing in the bay failed to establish valid reasons why oysters could not be cultivated in that body of water. The presence of a large number of marine animals of various types ranging from the lowest invertebrates to fishes, and including many species closely related to oysters, also indicates that physical and chemical conditions in the bay are basically favorable. It seems, however, that the exceedingly dense growth of sea grass and hydroids on the bottom of the bay may be partly responsible for the lack of oysters in many parts of that body of water. Such a heavy growth covering the bottom undoubtedly prevents the setting of oyster larvae, and interferes with the circulation of water, thus depriving oysters of their food. It is probably significant that at the only station in the bay where oysters were found, little or no grass was brought up in dredges. A heavy growth of hydroids at that station was probably responsible for the poor growth of oysters. The abundance of starfish and drills is considered another factor responsible for the disappearance of oysters from the bay.

According to the town's regulations the oyster bottom of Shinnecock Bay is public property, no private ownership of the oyster grounds being permitted. Because of the almost complete disappearance of oysters, however, members of the community derive little benefit from the resource. The present regulations are therefore of sentimental rather than of practical value. The very fact that the oyster grounds are public property may be responsible for the disappearance of oysters. Oystermen who make their living from public beds take, as a rule, very little care of them. No regular shell planting is practiced, and no attempts are made to combat oyster enemies such as starfish and drills. As a result, these oyster bottoms which have been very prolific in past years are either entirely barren or show a marked decrease in yield. Because of lack of cultivation, oyster grounds are being gradually covered with debris and a dense growth of sea grass and hydroids, which make them unsuitable for oyster growing.

Considering the facts that Shinnecock Bay is at present virtually devoid of oysters and that the Board of Trustees has no funds to engage in oyster cultivation it is recommended that the bottom of the bay be leased to persons depending upon shellfisheries for a livelihood so that planting, cultivation, and protection of oysters may be resumed.

Pollution of water in Cherrystone Inlet, Va.—Upon the request of the Virginia Commission of Fisheries, investigations were carried out by Dr. Chipman to determine the cause of the high mortality of crabs and fish in Cherrystone Inlet last summer. It was found that the waters in question were polluted by cannery wastes. Determina-

tions of the dissolved oxygen content and oxygen capacity of the water demonstrated the presence of a considerable amount of unstable organic matter in the water in the vicinity of the ditch leading from the cannery and extending into Cherrystone Inlet. From a 24-hour period of observation of the dissolved oxygen content of the water it was found that the dissolved oxygen in the early morning hours reached the extremely low level of only a few tenths of a part per million. Photosynthesis during the day brought about supersaturation of the water with oxygen in the late afternoon. The low oxygen area extended only a short distance into Cherrystone Inlet. On the basis of observations obtained from several trips to the area it was concluded that the high mortality of crabs and fish was a result of insufficient dissolved oxygen in the water, a condition brought about by the emptying of organic matter with high oxygen demand into the inlet by the cannery.

Investigations of the periodicity of fouling organisms.—At the request of the Bureau of Construction and Repairs, U. S. Navy Department, an analysis of the fouling organisms grown on experimental panels exposed at Cavite, Philippine Islands, and Guantanamo Bay, Cuba, was undertaken under the direction of Dr. Galtsoff. The work consisted in identifying the principal fouling groups and determining their abundance and the sequence of their appearance. The work was begun in September at the U. S. Fisheries Laboratory at Woods Hole and is being continued now by G. Robert Lunz, Jr., at the Charleston Museum, Charleston, S. C.

AQUICULTURAL INVESTIGATIONS

DR. H. S. DAVIS, *in charge*

It is now generally conceded that proper and efficient utilization of the fish resources of our inland waters is to be achieved only through the adoption of a comprehensive plan of fish management adapted to the needs of each body of water. The rapid increase in the number of anglers coupled with the construction of thousands of miles of new highways has resulted in such a drain on the fish population that previous methods of more or less haphazard stocking have proved inadequate to cope with the situation.

The need for the development of management plans has served to focus attention on the lack of factual information on which such plans must be based. Although the artificial propagation and rearing of trout have been practiced on an ever increasing scale for many years, there is little information on the survival of hatchery fish after being liberated in natural waters. There can be no question that stocking with legal trout shortly before and during the open season has been a success. There are also a few instances where stocking with smaller fish is known to have resulted in a material improvement in fishing. In the great majority of cases, however, there is no evidence that artificial stocking has had a beneficial effect. On the other hand there is considerable evidence that, in many cases at least, stocking has had very little effect on the fish population and that even in heavily stocked waters wild trout frequently make up the bulk of the catch.

Although it is probable that artificial stocking has been more successful than is indicated by available information, the conclusion is inescapable that a large percentage of hatchery fish have been wasted and that the only hope for improvement lies in acquiring information that will enable us to avoid the pitfalls of the past. It is a striking commentary on fish management as practiced in this country that while hatchery operations and methods of transporting fish have been materially improved in recent years, the fate of the fish after stocking has received practically no attention. We are confronted with an anomalous situation in which a highly organized industry producing an extremely perishable product at great labor and expense is almost entirely oblivious to the fate of that product once it leaves the hatchery. Both fish culturists and anglers call for fish, and still more fish, without any attempt to determine whether increased production is the answer to the almost universal complaint that fishing is growing poorer each year.

In view of these facts, a large part of the activities of the aquicultural staff is devoted to acquiring information on the results of stocking and the survival and growth in natural waters of hatchery fish as compared with wild fish. In addition to field studies, investigations of hatchery problems have been continued and arrangements have been made to devote more attention to such problems in the future.

TROUT

Test streams.—The scientific work at the Pittsford (Vt.) station under the direction of R. F. Lord has centered around the "test waters" which are managed in cooperation with the State Fish and Game Service. During the past 2 years three streams and one lake—the maximum authorized by law—have been operated as test waters. Of these streams only Furnace Brook has been operated as a test stream for 3 consecutive years. The total catch of legal trout in this stream was 8,589 in 1935, 6,995 in 1936, and 6,385 in 1937. It is evident that in spite of heavy stocking the yearly catch is gradually decreasing, as is the average catch per fishing effort, which dropped from 7.2 trout in 1935 to 6.5 trout in 1937. On the other hand it is surprising to find, as pointed out in previous reports, that there has been only a slight decrease in the catch of rainbow trout, which have not been planted in the streams in recent years and are, consequently, entirely dependent on natural propagation. As a result of the much greater decrease in the catch of brook trout the proportion of rainbows in the total catch rose from 34 percent in 1935 to 38 percent in 1937.

During the past season a field census station was operated on Furnace Brook every week end to obtain accurate information on the marked trout taken by anglers. These fish were over 6 inches long when planted as yearlings in the fall of 1936. Although only 7 percent of the marked fish planted were reported by anglers, a creel check showed that approximately 50 percent of the marked fish taken were overlooked. This would indicate that of 5,200 legal fish planted in Furnace Brook during the fall of 1936 only about 14 percent appeared in the anglers' catches the following season.

There is, as yet, no information on the fate of the remaining 86 percent.

On an acreage basis it is estimated that the total production of trout in Furnace Brook was 45.55 pounds per acre in 1935, 37.45 pounds per acre in 1936, and 37.17 pounds per acre in 1937.

It is interesting and most encouraging from a fish management standpoint to find that, although the number of anglers was much greater early in the season than later, there was very close agreement throughout the season between the percentage of angling effort and the percentage of fish taken. In other words, the average catch per fishing effort was remarkably constant throughtout the season. This provides strong support for the view that where conditions are favorable for trout it should be possible to maintain good fishing up to the end of the season, even in heavily fished waters.

Growth and food studies on St. Mary's River.—St. Mary's River, a trout stream near Vesuvius, Va., in the George Washington National Forest, was stocked with marked brook trout above the falls (impassable) and with marked rainbow trout below the falls in 1935 and 1936. Owing to the poor growth of the fish, the stream was not opened to fishing in 1937 and thus afforded an opportunity for a study of the trout population by E. W. Surber and Dr. J. S. Gutsell. The fish were caught almost exclusively by angling and most of them were returned to the stream after examination.

It was found that brook trout planted in 1935 had grown to an average length of 5.6 inches in April, 6.2 inches in July, and 6.6 inches in November. Only a few rainbows planted in 1935 were caught but the 1936 planting was well represented. These fish averaged 6 inches long in April, 6.8 inches in July, and 7 inches in November.

An examination of the stomach contents of brook and rainbow trout caught in May 1936 showed that the number of terrestrial insects greatly exceeded that of aquatic forms. Of special interest was the evident importance of crayfish as a trout food and the presence of considerable quantities of algae in the stomachs of rainbow trout. Parasitic nematodes were found in nearly all stomachs of both species of trout. These worms were present in considerable numbers and may be responsible, in part at least, for the slow growth of trout in this stream.

Pisgah Forest project.—The experimental fish management project in the Pisgah National Forest (N. C.) has now been in operation for over a year in cooperation with the U. S. Forest Service. The project is under the supervision of Wm. M. Keil, of the Forest Service, while the biological work is being conducted by Thomas K. Chamberlain, of the Bureau of Fisheries staff.

A detailed survey of the streams under management has been completed and maps prepared showing the physical characteristics of stream channels and banks.

Collections of bottom samples at 51 stations have been regularly and systematically carried out. Five of the major watersheds of the forest are included in these studies, although most attention has been given to the Davidson River drainage, where monthly collections are made from 51 square feet of bottom. Although still far from complete for the purpose of calculating the maximum carrying capacities of

the various streams, the results were used as criteria for setting up the initial stocking program.

Other investigations in this area include studies of the food of trout and other fish, collections of scales from brook, rainbow, and brown trout to be used in a comprehensive study of the growth of both wild and hatchery-reared trout in natural waters, and studies of the survival of trout after planting and their adjustment to the new environment, with special attention to the effect of winter conditions.

The Davidson River rearing station, constructed by the Forest Service, was operated very successfully. Sufficient trout of various ages and species were produced to carry out the stocking program as originally planned. Most of the fish were planted at 9 months of age and were as large as the average wild fish in their second and third years. While this growth rate cannot be expected to continue, these fish have at least been started in their new surroundings with strong, healthy bodies and a year's advantage in size. Specimens examined 2 to 3 months after planting were in excellent condition and compared favorably with wild fish in the same stream.

The Pisgah National Forest affords exceptional opportunities for fish management studies, since all streams can be opened or closed to fishing whenever desired and a complete check can be made of anglers' catches. The streams are patrolled regularly by Federal game wardens and there is little poaching.

Climatic and water conditions are also exceptionally favorable for management studies. The district has one of the heaviest rainfalls in the United States and participation is normally regular throughout the year. The comparatively short, mild winters allow a long growing season for fish and opportunities for studies of fish and fish food organisms that are not possible in more northern sections. Among the problems that are under investigation in this area is the extent to which both brook and rainbow trout of various ages and sizes migrate downstream when planted in the smaller and higher tributaries. The results of these studies will have an important bearing on the advisability of establishing so-called nursery streams that are closed to fishing on the assumption that the trout on reaching a certain size will descend to larger waters where they will be an important factor in maintaining the supply of legal trout.

Experiments are also under way to determine the stocking intensities of trout of various sizes that will produce most satisfactory results and the effect of various types of stream improvement on the production of fish and bottom food organisms. In several streams only marked trout of uniform size were planted so that it will be possible to get reliable data on the growth and survival of these fish.

California trout investigations.—The investigational program of this unit was continued under the direction of Dr. P. R. Needham, and good progress has resulted in spite of several changes in personnel and program. A. C. Taft resigned from the position of assistant aquatic biologist in January 1937, to become Chief of the Bureau of Fish Conservation of the California Division of Fish and Game. This position was not filled for the remainder of the fiscal year. As a consequence, the coastal stream steelhead investigations were turned over to the State Division of Fish and Game to be continued under the direction of that agency. Investigations at

the Hot Creek Rearing Ponds Project were concluded June 30, and investigations on the survival rates of hatchery-planted trout by means of the Convict Creek experimental stream, operated in cooperation with the U. S. Forest Service, were substituted as a major project.

Twenty-three plants of brook, brown, and rainbow trout were made during the season of 1937 in the experimental stream. Various age groups were used, and plantings were made under varying predator conditions to determine survival rates over varying intervals of time. Several of the experiments were failures because of faults in the physical set-up, such as holes under dams and clogging of screens. The information obtained during this first year has pointed the way for future operations and the biological data have provided definite guides for stocking programs. From the successful experiments it was determined that hatchery-reared advanced fry suffer great losses in wild waters, but that hatchery fish from three to four inches long show a high survival. Brown trout did better than the other species with rainbow trout next in order of success in the experimental plants. Studies of condition factors showed that hatchery-reared fish lost weight after planting and a measure was determined for the optimum stocking intensity in relation to the food supply.

In one section a survival of 100 percent was obtained following a plant of rainbow trout based on the table developed by Dr. G. C. Embody. In another section, stocked with 1,000 advanced cutthroat fry, only 34 fish survived to the end of the season. The presence of 10 wild predatory trout was responsible for the heavy losses.

In future operation it is planned to divide the experimental stream into a smaller number of sections. Emphasis will be placed on planting experiments with rainbow and brown trout.

Boat catch records were again obtained from anglers fishing Convict Lake. The catch per unit of effort rose slightly from 0.21 fish per hour in 1935 to 0.27 fish per hour in 1936. A total of 365 trout were reported by 286 anglers in the 1936 season while 184 anglers took only 167 trout in 1935.

Of the trout caught in Convict Lake in 1936, over 49 percent were unmarked rainbows and approximately 48 percent were brown trout. Only seven marked rainbows from the plant of 2,014 (average length 5.67 inches) planted in July 1935, were reported caught by boat fishermen in 1936, while 349 of these fish were caught in the season of 1935. Therefore, in 2 seasons' fishing a total of only 356 trout, or approximately 18 percent, of the 2,014 planted in 1935 have been reported caught. However, such a low survival may prove to be more apparent than real, since fish planted in the lake can easily leave through either the inlet or outlet. Several reports were obtained of marked rainbow being caught as much as one-half mile below the lake.

Cooperative investigations with the U. S. Forest Service were continued in the national forests of California, Oregon, and Washington. A survey was completed and stocking policies were developed for the headwaters of the South Umpqua River above Tiller, Oreg., in the Umpqua National Forest. In addition, complete angling catch records were taken on Fish Lake by the Forest Service. Fish Lake,

with an area of approximately 90 acres, lies at the very head of the Umpqua drainage. A total of 5,946 trout were reported caught, of which 5,878 were rainbow and the rest, eastern brook trout. The catch per angling hour was 4.18 fish. The total catch weighed 1,821 pounds which is a production of approximately 20 pounds of trout per acre of water area. The average length of the fish taken was about 9½ inches with an average weight of approximately 5 ounces. In 1935 and 1936 a total of 40,000 eastern brook trout were planted in Fish Lake, yet as noted above only 68 of this species were reported caught.

Through cooperative work in the Willamette National Forest in Oregon, a total of 174 lakes have been surveyed in the last 2 years and stocking policies recommended.

The U. S. Forest Service also financed the collection of catch records on Squaw Creek, a tributary of the Pit River in the Shasta National Forest. While no records were obtained for the month of May it is estimated that they are about 98 percent complete for the remainder of the season. A total of 2,497 rainbow and 7 brown trout were reported taken. The average catch was 7.4 fish per angler. Of rainbow trout taken, the 6- to 8-inch group formed 48.70 of the total and the 4- to 6-inch group 29.75 percent. Fish over 10 inches long made up only 5.3 percent of the rainbows caught. It is interesting to note that in the 4-year period from 1933 to 1936, 140,000 brown trout were planted in Squaw Creek. The fact that only 7 trout of this species showed up in the catch is strong evidence that conditions in Squaw Creek are not suited to brown trout and that the fish planted in this stream were wasted.

Introduction of Mexican trout.—In May 1937, Dr. P. R. Needham, accompanied by Fred Johnson of the U. S. Forest Service, made a trip to the Santo Domingo River in Baja California, Mexico, to secure living specimens of the southernmost coastal rainbow trout, *Salmo nelsoni*. The effort was highly successful and 50 fish were transported to the State hatchery at Forest Home in Southern California. These fish are to form the nucleus of a hatchery brood stock of this strain of trout. Efforts along this line are considered well worthwhile since it is hoped that these fish may be adapted to warmer water than other species of trout and that they also may prove to be nonmigratory. As soon as sufficient numbers are obtained, both laboratory and field experiments will be conducted to determine their true character and range of adaptability to varying stream conditions.

Nutrition studies.—Studies on trout nutrition have been continued at Cortland, N. Y., by Dr. C. M. McCay and A. V. Tunison. Two methods of attack upon the problems have been employed. The first attempts to improve current practices by the introduction of new feedstuffs that are available in large quantities and by improving the quality of the mixtures in current use. The second attempts to secure fundamental data in the fields of biochemistry, growth, and physiology in the interest of providing a sound basis of true science for guiding our changing practices. The study of disease at the Cortland Hatchery has been of minor importance since this involves special techniques that are not available. However, some attention has been given to diseases as they have arisen from time to time in the course of the other studies.

A better knowledge of the phenomena of growth whether of the entire body of the fish or of the component parts and their composition, is essential for a science of fish culture. For this reason four species of trout—rainbow, brook, lake and brown—have been under constant observation for 5 years. These four groups have been fed the same diet and kept under similar conditions in regard to the water supply. Growth curves for the four species under these conditions have been very similar. Increases in body weight have continued throughout this period but this growth rate has declined with succeeding years. This indicates that growth is determinate in fish although the cessation of increase in the size of the body is in a much later period of the life span than it is in higher mammals.

In the course of this long-time experiment certain species differences have been observed. All except the lake trout spawned at a normal age but this species did not spawn until September of 1937 when nearly 5 years of age. As the groups have become older there has been a tendency to develop ulcer disease and for individuals to die at about the spawning period in all groups except the lake trout. All of the brook trout have now died. The males of this group died before the females. The eggs from all groups have been consistently inferior and smaller than those from the same species held in ponds.

The question of the rate at which an animal should grow in order to develop the strongest body possible is one that is attracting increasing consideration in many fields of animal nutrition. No one desires to push the growth of an animal to the extent that he produces weaklings. One of the most difficult problems in the field is to determine what constitutes a weak animal in terms of the organs of the body and to detect weak organs that are unable to share in the growth of the body when that growth is unduly accelerated. For the above reason studies have been made of the rates of growth of the organs of the bodies of four trout species during the fingerling stage.

In this study the weights of the eyes, livers, hearts, and gastrointestinal tracts of trout were determined on April 16, July 9, and October 1. Part of the trout had been retarded in growth and part made to grow as rapidly as possible under our conditions. It has already been demonstrated by investigators working with other species that the organs of trout grow at unequal rates in comparison with the whole body. In cases of limited available foodstuffs certain organs, such as the eyes, are able to seize a disproportionate share compared to organs such as the heart. Thus, in retarded trout, the eyes grow more than the other organs and tend to represent a greater percent of the entire body weight. Organs such as the heart, liver, and the gastrointestinal tract represent about the same percent of the entire body weight whether the trout has been retarded in growth or not. In last analysis these organs and their composition probably determine whether or not the trout that are planted in the streams survive to greet the fisherman or die from their own inherent weaknesses. The tendency of the eyes to become a larger percent of the entire body weight may ultimately prove of some use as additional measurements of "condition factors."

As an additional part of the program to extend the science and to determine more about the relative hardiness of trout that are produced in hatcheries, the Cortland Station has continued its study

of the chemical composition of trout of different ages. This work has been severely hampered by lack of both equipment and skilled assistants but progress is being made. As this phase of the work progresses it is hoped to include even the egg in its early development because here must lie some of the secrets of producing sound trout. Special attention is now being devoted to the exchange of nutrients between the sac and the fry in the period just after the eggs are hatched.

In the interest of improving the practical diets now used in the hatcheries special studies have been completed during the past year of such products as linseed meal, meats preserved in acid, various fish meals and seal meal. Linseed meal has been freed from its poison by steaming and pressure cooking. These processes provide a nontoxic meal that still retains the important property of binding water and liquids such as meat juices.

In the study of preserved meats it has been found that acids such as hydrochloric, phosphoric, and acetic, are satisfactory especially when their action is supplemented by that of molasses. After long storage of ground meats and molasses the meat tends to liquefy and to lose some of its value probably due to the loss of factor H. No evidence of toxicity has been discovered and the hydrolysis is only partial because there is little increase in amino nitrogen. A satisfactory method of keeping meats for long periods without spoilage, without deterioration in nutritive value and without loss of physical properties, has not been discovered thus far but progress is being made. The importance of such a development is evident since it would decrease the labor and the investment in refrigeration equipment as well as make it possible to purchase meat at periods of low prices.

Salmon carcass meal has proved somewhat more satisfactory in practical feeding than seal carcass meal although both can be used. White fish meal from which much of the bone has been excluded has been found of sufficient value to justify the additional cost of this special product.

The primary function of the Cortland station has been to develop a science of fish nutrition and to provide improved feeding practices for American hatcheries. Inevitably, however, diseases other than nutritional ones arise in the course of such investigations. These have been excluded when possible but some use has usually been made of epidemics to discover possible interrelationships with the nutrition.

During the spring of 1937, the yearling and adult brook trout developed ulcer disease. These were divided into groups and fed various vitamin concentrates and specific chemical compounds. Some of the products fed were vitamin C, extract of pine needles, potassium iodide, dried yeast, arsenious oxide, boric acid, borax, dinitrophenol, thallium acetate, and sulfanilamide. This heterogeneous list represents specific selections in a rational attack but failure resulted in every case. The last compound, sulfanilamide, was the only one that afforded any hope of usefulness that would justify further study.

During the past year efforts have been continued to develop better methods for chemical balance studies with trout. The aim of such

studies is to measure the fractions of foods that are utilized after they are ingested by trout. In this work as in all projects involving chemical techniques, progress has been slow owing to the difficulties of the problem and to the deficiency in equipment and trained personnel.

At the Leetown, W. Va., station, an experiment was conducted with rainbow fingerlings, to test the value of certain commercial feeds in comparison with seal meal and salmon carcass meal manufactured by the Bureau. The dry foods were first fed at a 30 percent and later at a 40 percent level with beef liver. The fish fed salmon carcass meal rapidly outgrew those on other diets and at the end of the experiment were 42.4 percent heavier than those in the best of the other lots.

Selective breeding.—Selected lots of fingerlings were carried through the summer of 1937 at the Pittsford station and the best lots retained for breeding purposes. In the fall of 1937, 50 pairs of the best available 2-year fish were mated and the eggs segregated.

Owing to the necessity for economy in operation of the hatchery, it has not been possible to obtain maximum growth in the select lots but the effects of breeding are nevertheless manifest in the yield of eggs which averaged 1,370 per pound of fish instead of the usual rate of 1,000 eggs per pound for fish of the same size.

BASS

The field studies on smallmouth bass begun in 1936 were continued under the direction of E. W. Surber. These investigations are concerned with much the same problems in bass streams as are the trout studies in colder waters. Although, as already pointed out, there is a surprising lack of factual information necessary for the formulation of fish management plans for trout waters, the dearth of information concerning bass waters is even more marked. No systematic studies on the activities of bass in natural waters have been feasible throughout the year and there is practically no information on the normal productivity of bass waters. Although bass are now being propagated on an extensive scale throughout the country there is little evidence that fishing for either large or smallmouth bass has been appreciably improved by stocking. It is probable that natural propagation is more efficient than in the case of trout and that there may be less need for artificial aid. This, however, is a matter that can be determined only by comprehensive and systematic studies carried on continuously over a considerable period. It is for the purpose of securing such basic information that the investigations on bass streams were inaugurated and the results already obtained are of great practical value.

In addition to the two experimental sections previously established on the Shenandoah River near Berryville, Va., and on the South Branch of the Potomac River near Romney, W. Va., observations were made on sections of similar length in the Cacapon River near Largent, W. Va., and the North Fork of the Shenandoah River near Strasburg, Va. Stream conditions were entirely satisfactory for observations on the extent of natural propagation in the South Branch and Cacapon Rivers but in the Shenandoah and its North Fork visibility was much poorer.

Observations on spawning.—In the 1937 survey of the 3-mile section of the South Branch 205 smallmouth nests (68.5 per mile) were found on May 14 and 15, as compared with 142 nests found in this section during the 1936 survey. These nests were at an average depth of 33.2 inches and the average distance from shore was 9 feet. The eggs were counted in 10 nests and found to average 1,700 to each nest. Very few dead eggs were found.

In the Cacapon River, the average number of nests per mile was 13.75 and in the Shenandoah River there was an average of five nests per mile. Owing to the turbidity it is probable that some nests escaped observation. Fry counts made later along the same section indicated that the number of nests must have been considerably greater than observed. On the North Fork of the Shenandoah River an average of five nests per mile were observed in the experimental section.

In spite of these unfavorable conditions, a considerable number of older bass were taken for scale studies. In the South Branch of the Potomac River the average length of bass in their second year was 6.69 inches, in their third year 8.75 inches, in their fourth year 10.13 inches, in their fifth year 10.81 inches, in their sixth year 16.0 inches, and in their seventh year 17.0 inches. In other words, smallmouth bass in the South Branch did not attain the legal length of 10 inches until their fourth year and of the fish of this age more than 42 percent were under legal size.

In the Cacapon River the meager data available indicate that the situation is even less favorable. Of 24 smallmouth bass taken by angling on June 1, not a single fish was of legal size and the largest fish taken (9.75 inches) was in its fifth year. A 6-year fish was only 9.5 inches long.

On the other hand, bass in the North Fork of the Shenandoah River were found to make much more rapid growth. Here 2-year fish averaged 7.69 inches in length, 3-year fish 10.52 inches, and fish taken in their fourth year showed an average length of 12.13 inches. It is interesting to note that the North Fork is very nearly the size of the South Branch.

During 1937, progress was made toward placing field observations on a quantitative basis. Counts of bass in three sections of the South Branch of the Potomac River varying in length from 3 to 4.6 miles agreed very closely, showing, respectively, 105, 107, and 124 fish per mile. In contrast only 19 bass per mile were noted in the North Fork of the Shenandoah River.

It is of interest to note that in these rivers all of the bass appear to spawn at one time and there is no evidence of later spawning extending into the month of June. In the South Branch of the Potomac, where the extent of natural spawning is greatest, the fry disappear with extreme rapidity and there seems little doubt that the bass themselves are largely responsible for the losses.

Growth studies.—Fingerling bass in the South Branch of the Potomac attained an average length of 64 mm by mid-September while the trend in the growth of fingerlings in the Shenandoah River (no collections made after July 30) indicated that the bass in this stream again would have easily outstripped those from the South Branch had they maintained the growth rate shown by fish collected up to July 30, when the average length was 59.5 mm. In the Cacapon

River fingerling bass averaged 69 mm in length by September 1, and in the North Fork of the Shenandoah the average length on September 16, was 75 mm.

The 1937 season proved a poor one for the collection of fish and bottom organisms because of high water from frequent rains. As a result samples could not always be collected at regular intervals, and the number of fish caught was sometimes inadequate.

There seems little doubt from general observation that forage minnows are considerably more abundant in the Shenandoah River and its North Fork than in the South Branch and Cacapon Rivers, but to date the quantitative methods employed have not established this fact.

One of the most important results of the studies on the Shenandoah and South Branch of the Potomac Rivers during the past 2 years is the evidence that the latter stream is at present overstocked with bass. That this is the case is indicated by the large number of bass nests observed and the slow growth of young bass in the South Branch. In this stream smallmouth bass do not attain the legal length of 10 inches until their fourth year and over 42 percent do not reach this size until their fifth year. In contrast, bass in the North Fork of the Shenandoah, which is comparable in size with the South Branch, reach legal length in their third year and in their fourth year average two inches longer than bass of the same age in the South Branch.

The large number of nests observed in the South Branch also leads to some interesting speculations on the effect of stocking. As previously stated, an average of 68.5 nests per mile were observed in 1937 in the experimental section. Since the average number of eggs in each nest was approximately 1,700 and there were very few dead eggs it is evident that at least 115,000 fry per mile were produced. It is not probable that all the nests were seen, since observations were made only on two consecutive days, so that we may estimate the fry produced in this section of the river at over 125,000 per mile. There are approximately 75 miles of bass water in the South Branch and if we assume that an average of 100,000 fry per mile were produced in this area we find that it would require 7,500,000 fry to stock the South Branch at the same rate as was done by nature. Even if we reduce the estimate by 50 percent some 3,750,000 fry would be required, which would be a large order for any hatchery.

Food studies on fingerling smallmouth bass.—The stomach contents of 1,076 fingerlings collected at monthly intervals in test sections of the South Branch and Shenandoah Rivers have been examined. These collections permitted seasonal comparisons of the food of growing fingerlings from the time they rose from the nests until the end of the growing season. It was surprising to find that 10 percent of the Shenandoah River fry, averaging 10 mm long, had consumed fish. Many of these bass had not yet completely absorbed their yolk material. The chief items of food, however, were nymphs of the genus *Boetis* and midge larvae. As the bass increased in size, fish became more important in the diet, except in the South Branch where the data reflect a scarcity of forage minnows.

Bottom fauna studies.—A quantitative study of the bottom fauna in the Shenandoah and South Branch Rivers showed that the number and weight of organisms per square foot was much less in the pools

than in the riffles in both streams, but in pools of the South Branch there was about twice as much food as in pools of the Shenandoah Rivers. The weight of organisms per square foot in the riffles was considerably greater in the Shenandoah than in the South Branch. Moreover, the former river has more extensive riffles in which bass can feed than has the latter.

Parasites in fingerling bass.—It was found that fingerling bass from both the South Branch and Shenandoah Rivers were infested with parasitic trematodes that were encysted in the liver. These parasites were much more numerous in fish from the South Branch than in those from the Shenandoah. Approximately 75 percent of fingerling bass from the former stream were parasitized as compared with about 12 percent from the latter. Bass from the South Branch also contained many more cysts, on the average, than those from the Shenandoah River. Considering the abundance of cysts in many instances, it is remarkable that there is no evidence that the parasites affected the growth since the average size of infested fish was very nearly the same as that of the uninfested.

Forage minnows in bass ponds.—Three ponds at the Leetown Station were stocked very heavily with blackhead minnows before the bass fry were introduced. Each pond when drained in the fall contained only a relatively small number of bass, although they were all of large size, averaging 6.5 inches in length. The obvious explanation of the disappearance of the bass fry is that they were eaten by the minnows although direct observations are lacking. In view of this possibility, it seems advisable to rear bass fry to a larger size before transferring them to ponds containing forage fish, or to defer the stocking of brood minnows until the fry have attained a length of three-fourths of an inch or more.

FISH DISEASES

Studies on fish diseases were continued by Dr. Frederic F. Fish at the pathological laboratory in Seattle, Wash. An investigation of furunculosis completed at Lake Madison, Mont., showed that a small percentage of loch leven trout were infected with the disease. Spawntakers, however, reported the incidence of infected fish to be much lower than in 1934 and 1935. They also reported that the number of fish running into the traps showed a marked progressive decline during those years. It appears probable that furunculosis contributed materially to this decrease in the loch leven trout population in Lake Madison. If this supposition is correct cyclic increases and decreases in the numbers of these fish are to be expected in the future.

A program of disease control studies was instituted at the field laboratory recently constructed with the cooperation and financial assistance of the Division of Fish Culture at the Bureau's hatchery located at Quilcene, Wash. Both preventive and therapeutic measures for combatting the common hatchery diseases were investigated under controlled conditions. These experiments showed conclusively that fingerling trout can be subjected to routine preventive treatments at weekly intervals without incurring any increase in mortality.

In two series of experimental infections the common protozoan parasite *Cyclochaeta* was allowed to increase to epidemic proportions

and various treatments in common use were then administered to determine their relative value. In most cases the treatments failed to produce the beneficial effects commonly ascribed to them. Common salt and the use of a malachite green solution at a concentration of 1,400,000 for 1 hour were more efficacious than other methods tried but even these were not effective in checking the disease. Unfortunately, all experiments had to be terminated early in October owing to the annual egg-taking activities at the station.

Considerable attention has been devoted to a myxosporidian parasite *Henneguya salminicola* Ward, which infests the pink and silver salmon of the Pacific coast. This parasite forms white cysts in the body muscles which, when abundant, give rise to the condition known locally as "tapioca." In some sections of Alaska a considerable percentage of the pink salmon may be infected with this parasite.

A disease caused by a myxosporidian parasite of the genus *Myxobolus* was found among bass fingerlings and brood fish at the Bureau's station at Miles City, Mont. It is claimed that the infection has been gradually increasing, its occurrence being estimated at 20 percent this year. The lesions appear as conspicuous lumps on the back and tail of infected fish. Since Myxosporidia require no intermediate host for completion of the life cycle it is feared the distribution of bass fingerlings from the Miles City station will result in widespread dissemination of the parasite. Studies on the parasite are being continued in the hope of developing some practical method of control.

The Disease Service maintained for assisting State, Federal, and private fish culturists in the solution of their disease problems has increased in popularity. Over 200 shipments of preserved specimens were sent to the Seattle laboratory for diagnosis and a large number of shipments were also received at the Washington laboratory.

INVESTIGATIONS IN INTERIOR WATERS

DR. M. M. ELLIS, *in charge*

POLLUTION STUDIES

Over 150 new localities have been investigated in the course of the stream pollution studies made by the staff of the Columbia, Mo., unit during the past year, and observations have been continued at some 70 old stations. The routine analyses and bioassays required to test and standardize the effluents and samples collected have occupied the time of five laboratory workers under the direction of an aquatic physiologist throughout the year. The combined data from these field and laboratory studies of pollution and polluting substances have been applied to fisheries problems in three ways. Using these data as a scientific background 43 major cases of stream pollution in North Carolina, South Carolina, Delaware, Virginia, Mississippi, Alabama, Louisiana, Texas, California, Oregon, Washington, Idaho, Montana, South Dakota, and New York, have been investigated this year by field parties from the Columbia, Mo., unit and reports have been prepared, or are in the process of preparation, for the guidance of officials and industries involved; over 200 answers to queries from State officials, manufacturers and others in-

terested in particular pollution problems have been sent out; and understanding of the actions of industrial pollutants, particularly of dye wastes, pulp and rayon effluents, petroleum waters and mine waste has been materially advanced. The voluntary cooperation of many manufacturers in the practical application of these findings to definite pollution problems and in the following of recommendations for the elimination of pollution nuisances has been most gratifying.

This year's work has carried the pollution survey into several new States so that every State in the Union and all of the important river systems have now been included in the investigations. The field and laboratory work has been completed for the second part of the pollution bulletin.

The basic physiological studies of salmonids, bass, and catfish on which the applications of the pollution analyses and assays are made have been continued and extended to include the physiological reactions of fishes of these three groups to the minute quantities of the less abundant substances present in stream, lake, and impounded waters. Extensive experimental tests utilizing special apparatus developed for these physiological studies have been carried on throughout the year and are still in progress at the Columbia laboratories, and as a part of this work large series of catfish are being maintained under experimental conditions at Ft. Worth, Tex., by two members of the staff of this unit.

These physiological experiments have directed attention to the cumulative effects of prolonged exposures to very small quantities of substances which are apparently without immediate action on the fish. The tests with fluorides, for example, which are found in small quantities in many waters in the southwest, have shown that continuous exposure to even small quantities of these salts as found in some of the southwestern streams produces definite detrimental changes in the reproductive system and in the musculature of the fish, thereby impairing both the fertility of the fish and the quality of its flesh. Technical publications on these salts and several others will appear soon.

The field work correlated with these physiological studies of individual fish has involved the investigation of bog-fed streams, streams of glacial origin, mountain streams, and western impounded waters. Detailed surveys of the waters of Elephant Butte Reservoir, Lake Mead, and several of the smaller western impoundments were made during the summer in cooperation with a committee of the National Research Council and definite investigational programs were initiated at Elephant Butte and Lake Mead. This work was then continued in several western streams, including the Colorado, Columbia, and upper Missouri systems. Although not yet completed, practical applications of these studies have already appeared in connection with the stocking programs of various western streams on which impoundments are being built or are contemplated, and explanations have been obtained concerning the unproductiveness of certain reservoirs and streams in these regions. Twenty-five sets of analyses and assays have been made already for Federal and State officials to determine the suitability of waters from various springs, wells, and impoundments for fish or for fish hatchery purposes, in view of the physiological findings now available. Special equipment, not available heretofore, has been devised for the mobile field laboratories, and some of the physiological studies of the fish can now be made in the field.

MUSSEL PROPAGATION

The previous plantings of fresh-water mussels reported last year have been followed and extended. The observations to date show much better survival of the yellow sand shells than of the muckets. This may be due in part to the fact that the yellow sand shells grow much faster than the muckets and were more readily found. Even local mussel diggers who had not been apprised of the plants remarked on the increase in young yellow sand shells in the localities where plants had been made.

The program of plantings as previously outlined will be continued during the next 3 years, i. e., until a 5-year planting has been completed. At that time complete returns concerning the success of the restocking program will be available. Because an objection was raised by some of the manufacturers to the planting of yellow sand shells, fewer of that species were planted last year, but in view of the greater survival of yellow sand shells as noted above equal numbers of sand shells and muckets will be planted during the 1938 restocking.

ICHTHYOLOGICAL INVESTIGATIONS

Fishes of the Canal Zone and Panama.—Investigations on the Canal Zone and in Panama, begun in 1935, were continued in 1937 in cooperation with the Gorgas Memorial Laboratory and the Panama Canal by Dr. Samuel F. Hildebrand. A period of 3 months was spent in the field. During this time the locks at the Pacific end of the Canal were unwatered, and collections of fish were made (as in the locks at the Atlantic end in 1935). A study of the specimens and data is under way to determine to what extent the Panama Canal and the locks are used as passageways for fishes. Marine fishes have invaded the fresh water of the Canal to a surprising degree, and at least one species has crossed from the Atlantic to the Pacific.

A study of the feasibility of attempting further introductions of American food and game fishes in Gatun Lake (earlier attempts having failed) was made upon the request of the Panama Canal Government. It was decided that previous attempts to introduce fry had failed because of the great abundance of small native predatory fishes. It was therefore recommended that in the future the fish be reared to a length of six inches or more before liberation. Extreme caution must be exercised in the choice of species, because it is highly necessary to conserve the native mosquito-eating top minnows, important in the control of malaria.

General collections of fishes were made in various sections of Panama, both in fresh and salt water. The study of the fresh water material, which is nearly complete, has resulted in the discovery of several new species and has demonstrated that the fresh water fishes of the Atlantic and Pacific slopes have intermingled in the Canal to some extent and that limited hybridizing of very closely related species has taken place.

American Anchovies.—The study of the American anchovies undertaken by Dr. Hildebrand more than a year ago was continued as other duties permitted. Observations on Atlantic coast species of both North and South America are nearing completion. A few Pacific coast species, closely related to Atlantic species, also were studied.

The study has resulted in the discovery of several new species, in a better understanding of the relationships existing between the various species, and in a more logical division of genera.

Fishes of Tortugas, Fla.—Because of a desire expressed by the late Dr. William H. Longley shortly before his death, Dr. Hildebrand was requested by the President of the Carnegie Institution to complete a monograph on the fishes of Tortugas. Dr. Longley's studies had extended over many years, but his manuscript was unfinished at the time of his death.

General Systematic Studies.—Revisional studies of the genera of American fishes have been continued by Isaac Ginsburg. With the completion of a paper dealing with certain genera of the difficult family Gobiidae, the majority of the species of this family in American waters have been worked up on a sound scientific basis. In connection with his revisional studies Mr. Ginsburg gave his attention to the species problem, and published a preliminary paper on this question which is of general biological significance.

INDEPENDENT ACTIVITIES OF THE FISHERIES BIOLOGICAL LABORATORIES

WOODS HOLE, MASS.

Although the laboratory of the U. S. Fisheries station at Woods Hole was not open during the summer, a small number of outside investigators were accommodated for limited periods. As usual, the facilities were utilized in connection with the oyster investigations reported upon elsewhere. In addition, the following persons occupied and worked in the laboratory rooms: Dr. Hugh M. Smith, associate curator in zoology, U. S. National Museum, working on completion of report on fresh water fishes of Siam; Dr. Edwin Linton, University of Pennsylvania, helminth parasites of fishes; E. H. Barnes, biologist, Division of Fish and Game, Massachusetts State Department of Conservation, perfecting the methods of hatching and rearing lobsters; Dr. F. G. Hall, professor of zoology, Duke University, assisted by Dr. F. H. McCutchson, State College, Raleigh, N. C., and Dr. J. W. Wilson, Duke University, respiratory function of the blood of marine fishes. Lack of sufficient funds made it impossible to operate the laboratory on the same basis as in the years prior to 1932.

BEAUFORT, N. C.

Research.—Facilities for the study of marine fishery problems in the South Atlantic region were provided throughout the year by the Beaufort laboratory. The chief investigations conducted here by the Bureau's staff under the direction of Dr. H. F. Prytherch consisted of experiments and studies with reference to (1) the life history and control of a sporozoan parasite of the oyster, (2) the propagation of diamond-back terrapin, and (3) the utilization of marsh areas for mullet and oyster propagation.

Assistance was given to the following agencies, as indicated, on matters of importance to the fishery industries of the South Atlantic region: U. S. Engineer Department, advisability of deepening and maintaining Drum Inlet and Cape Lookout Inlet as an aid to the fishing industry in Core Sound, N. C.; U. S. Post Office Department,

presentation of evidence pertaining to investigation of operations and claims of Florida oyster promoting concerns; Virginia Commissioner of Fisheries, studies of the reproductive condition of winter dredged crabs from Chesapeake Bay; North Carolina Department of Conservation and Development, practical procedure for continuation of oyster rehabilitation program; Duke University, construction of biological laboratory at Beaufort, N. C., for studies of marine life of this region; Union Carbide and Carbon Corporation, corrosion tests with stainless steel cable under marine conditions.

Laboratory facilities for marine research have been provided for 11 independent investigators from other institutions who were engaged in the following studies: Dr. H. V. Wilson, professor in the University of North Carolina, behavior of embryonic cells under controlled conditions; Dr. A. S. Pearse, Duke University, crustacean parasites and marine ecology; Dr. W. C. George, University of North Carolina, blood of Echinoderms and Annelids; Dr. Henry Vander Schalie, University of Michigan, the mollusca of the Beaufort area; Dr. H. H. Harkins, Fordham University, attachment of Cirripedia to submerged surfaces; Fred F. Ferguson, University of Virginia, morphology of marine Rhabdocoeles; W. Henry Leigh, University of Illinois, the parasites of marine fishes; Gordon H. Tucker, University of North Carolina, regeneration in certain of the lower invertebrates; J. Albert Fincher, University of North Carolina, cell behavior and embryology of sponges; John C. Ayers, Duke University, respiration of crustacea; George W. Wharton, Jr., Duke University, gregarine development in mud crabs.

Terrapin culture. The terrapin farm or hatchery operated at the U. S. Fisheries biological station at Beaufort is the largest in the world. It has produced more than 116,000 diamond-back terrapin since the artificial propagation of this species was undertaken in 1909. During the summer of 1937, 11,783 baby diamond-backs were hatched in the five concrete breeding pounds surrounding the station. This brood after being cared for under protected conditions for a period of approximately 9 months will be distributed throughout the South Atlantic region in cooperation with the various State conservation departments. Just prior to 1931 the brood stock was increased to 1,775 females and 440 males and since then the hatch of young terrapin has ranged from 10,060 per year to a record production of 13,245 in 1935. Capt. Charles Hatsel has been in immediate charge of this work since its inauguration.

Though breeding of diamond-back terrapin under seminatural conditions has been very successful, the general results indicate that each adult female has produced an average of only 6.5 young per year whereas twice this number should be expected according to previous experiments with small lots of animals. During the summer of 1937, experiments were conducted under the direction of Dr. Prytherch in which the brood stock was distributed in the breeding pounds in different concentrations and in varying percentages of each sex. It was found that the ratio of males to females, though varying from 1 to 2 to over 1 to 6, had no noticeable effect on egg production in the different pounds. The principal factor appears to be the degree of crowding of the brood stock as shown by the results from 3 similar pounds in which the hatch per female was 3.0, 6.2, and 9.3

with concentrations of 521, 482, and 310 adults per pound, respectively.

The best results were obtained when 310 adult terrapins were confined in a pen 60 feet square, at a ratio of 1 male to 6 females. This lot produced a total of 2,511 young. Two recent collections of wild stock, aggregating 342 invididuals, show that when the terrapin congregate at the natural breeding areas there is a sex ratio of approximately 1 to 6. Of further interest in this connection is the fact that terrapin previously reared from the egg to sexual maturity at the Beaufort station show a ratio of 1 male to 6.4 females.

Studies were also made in the early summer to determine whether a portion of the brood stock, consisting of rather old females, were "boarders" and incapable of egg production. Examination of several marked specimens from the original brood stock which has been in captivity since 1909, showed that each contained from 7 to 9 completely formed eggs and approximately 3 times this number of developing ova of various sizes. The mature eggs taken from these animals were placed in the sand beds used for incubation and showed a hatch of over 85 percent. These observations indicate that diamond-back terrapins are capable of producing a good supply of eggs and young until they are at least 40 years of age.

Utilization of marsh areas for oyster and mullet propagation.—In many parts of the world improved marsh areas and tidal flats are successfully used for fish and shellfish propagation. In cooperation with the Works Progress Administration a project was undertaken to construct a series of marsh ponds in the vicinity of the Beaufort laboratory to determine the value of such structures for increasing the production of oysters, mullet, and possibly other marine animals in the South Atlantic and Gulf region.

The construction of one large tidal pond, 2½ acres in extent, and several smaller ponds, 20 by 40 feet, is virtually completed and will be ready for experiments in 1938. A substantial dike 800 feet long separates the large pond from adjacent waters but permits a regular exchange of sea water by means of two tide gates. Each gate is supplied with 9 wire screens of 3 different mesh sizes to retain the young mullet that are to be placed in the pond in the early summer. The general plan is to rear the mullet to marketable size in this experimental pond from which they may be harvested at any time of the year, and to determine from its operation the most satisfactory and practical procedure for producing these fish in commercial quantities in larger ponds or controlled tidal bays. A considerable area of hard bottom, created in the pond by deepening and leveling operations, is suitable for growing oysters and clams and will be stocked with these shellfish. The shells of the oysters generally support a good growth of plant life which serves as a natural food supply for the mullet.

The series of smaller ponds which will be used primarily for oyster culture experiments have been excavated in a representative salt marsh area with adjustable gates for controlling the depth and flow of water. Ordinarily if seed oysters were planted at pond level so as to be exposed to air at times of low water they would produce inferior market stock because of attachment and crowding of subsequent generations. However, by maintaining a minimum depth of

1 foot or more of water in the ponds at all times this trouble can be eliminated as it is under similar natural conditions. In thus controlling the setting of oysters pond areas of protected bottom that are particularly suitable for growing and maturing these shellfish are created in the marsh. Such areas are greatly needed for the development of oyster culture in the South Atlantic region. Another advantage of this type of pond is the fact that it can be automatically drained at proper intervals for cleaning or harvesting purposes, and particularly for killing, by exposure to air, the boring sponge which is so destructive to oysters on submerged beds in this region. In operation of the ponds, a series of experiments and studies will be made as to the growth rate of oysters and their increase in volume in relation to density of planting, minimum depth of water maintained and the quantity of water supplied by tidal action.

APPROPRIATIONS

The biological investigations of the Division of Scientific Inquiry during the calendar year 1937 were conducted with funds provided by the annual appropriation, Inquiry Respecting Food Fishes, and with the aid of small balances, remaining in special funds made available for the fiscal year 1937. The appropriation for 1938 was $262,000 but required administrative savings of $30,000 reducing the actual working funds to $232,000. Travel funds appropriated separately for 1938 amounted to $27,000. Approximately one-half of each year's appropriation was spent in the calendar year.

The 1937 appropriation was about 4½ percent greater than for 1936 and the 1938 appropriation provided a further increase (of roughly 50 percent) in available funds. This increase served to offset the nonavailability of emergency and special funds which in 1937 amounted to $42,456 and to expand existing projects. A statement of funds for biological investigations is given below:

Project	1937	1938
Regular appropriations:		
Commercial fishery investigations	$113, 530	$133, 181
Oyster cultural investigations	19, 200	50, 579
Aquicultural investigations	33, 845	42, 500
Conserving fish by screens and ladders	1, 550	1, 500
Washington laboratory and administration	3, 875	4, 240
Traveling expenses	----------	27, 000
Total	172, 000	259, 000
Allotment for maintenance and operation of vessels	26, 300	29, 000
Special funds:		
York River oyster pollution investigations	17, 456	----------
Shellfish pest control studies	25, 000	----------
Marine fouling studies	----------	1, 500

U. S. DEPARTMENT OF COMMERCE
DANIEL C. ROPER, Secretary
BUREAU OF FISHERIES
FRANK T. BELL, Commissioner

Administrative Report No. 31

ALASKA FISHERY AND FUR-SEAL INDUSTRIES IN 1937

By WARD T. BOWER

APPENDIX II TO REPORT OF COMMISSIONER OF FISHERIES
FOR THE FISCAL YEAR 1938

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ADMINISTRATIVE REPORT SERIES

Since the beginning of the Administrative Report Series, considerable confusion has arisen concerning the system of numbering the separates composing it. Inasmuch as the Reports of the Divisions vary in order from year to year, many have found their designations as "Appendix No. I, II, III, or IV" very confusing. To relieve this, it has been decided to number them as "Administrative Report No. —." Inasmuch as 20 separates had already been printed in this series before starting the numbers, it was deemed advisable to begin the numbering with Administrative Report No. 21. Of course, numbers cannot be printed on those already off the press, but for the information of those who wish to know what the first 24 were, they are numbered for filing purposes as follows:

No. 1. Report, Commissioner of Fisheries, 1931.
No. 2. Alaska Fishery and Fur-Seal Industries, 1930.
No. 3. Fishery Industries of the United States, 1930.
No. 4. Progress in Biological Inquiries, 1930.
No. 5. Propagation and Distribution of Food Fishes, 1931.
No. 6. Report, Commissioner of Fisheries, 1932.
No. 7. Alaska Fishery and Fur-Seal Industries, 1931.
No. 8. Fishery Industries of the United States, 1931.
No. 9. Progress in Biological Inquiries, 1931.
No. 10. Propagation and Distribution of Food Fishes, 1932.
No. 11. Alaska Fishery and Fur-Seal Industries, 1932.
No. 12. Progress in Biological Inquiries, 1932.
No. 13. Fishery Industries of the United States, 1932.
No. 14. Propagation and Distribution of Food Fishes, 1933.
No. 15. Fishery Industries of the United States, 1933.
No. 16. Alaska Fishery and Fur-Seal Industries, 1933.
No. 17. Progress in Biological Inquiries, 1933.
No. 18. Propagation and Distribution of Food Fishes, 1934.
No. 19. Alaska Fishery and Fur-Seal Industries, 1934.
No. 20. Fishery Industries of the United States, 1934.
No. 21. Progress in Biological Inquiries, 1934.
No. 22. Propagation and Distribution of Food Fishes, 1935.
No. 23. Alaska Fishery and Fur-Seal Industries, 1935.
No. 24. Fishery Industries of the United States, 1935.

Note that the last Commissioner's Report was for 1932. Since then its place has been taken by a reprint from the Report of the Secretary of Commerce under the title "Bureau of Fisheries." Inasmuch as it is no longer a Bureau publication, it is not numbered; but it will be supplied to any who request the Report of the Commissioner for any year since 1932.

ALASKA FISHERY AND FUR-SEAL INDUSTRIES IN 1937[1]

By WARD T. BOWER, *Chief, Division of Alaska Fisheries*

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[1] Appendix II to the Report of the U. S. Commissioner of Fisheries for 1938. Approved for publication June 23, 1938.

INTRODUCTION

The two main functions of the Bureau in Alaska are the conservation of the fisheries and the protection and management of the fur-seal herd that has its breeding grounds on the Pribilof Islands. Deputy Commissioner Charles E. Jackson and other officials spent several weeks in Alaska during the 1937 season, observing both fishery and fur-seal activities.

Regulations for the control of commercial fishing to assure an escapement essential for propagation were modified but slightly during the fishing season, and all changes recommended for the revised regulations to be effective in 1938 were of minor importance. The generally satisfactory condition of the fisheries is indicated by the fact that the production in 1937 was the third largest on record, the quantity of canned salmon being noteworthy because for the first time in an odd year it exceeded 6,000,000 cases.

A patrol of the fishing grounds was maintained by the Bureau's fleet of 14 vessels and numerous small boats, supplemented by occasional aerial inspections, chiefly during weekly closed periods. Approximately 165 temporary employees served as stream guards during the fishing season, in addition to the regular personnel of about 60 persons, principally wardens and operators of vessels, engaged in the enforcement of the fishery laws and regulations.

Whenever practicable in connection with their patrol duties, Bureau employees gave attention to the improvement of salmon streams, removing log jams and other barriers that prevented the ascent of salmon to the spawning grounds.

An important phase of the conservation program is the control of predatory trout, which feed upon salmon eggs and fry. This work was carried on chiefly in the Bristol Bay and Cook Inlet regions, where a bounty was paid for Dolly Varden trout through funds provided by the Territorial Legislature and by the local salmon packers. Some predatory trout were taken also by Bureau employees in connection with weir operations.

Biological studies of the salmon and herring were continued, and similar investigations in regard to predatory trout were begun in the Kodiak region with a view to obtaining data as a guide to a rational control program.

Attention was given by the Department of Commerce, in cooperation with the Department of State and other Government agencies, to the problem of averting the threatened encroachment on the Alaska salmon fisheries so as to assure the protection and perpetuation of the important food resource and industries involved.

There were 55,180 fur-seal skins taken at the Pribilof Islands in 1937, or 2,734 more than in the previous year. The computed number of animals in the herd as of August 10, 1937, was 1,839,119, as compared with 1,689,743 in 1936. Incidental to the fur-seal industry, the feeding and management of blue-fox herds on the Pribilof Islands

was continued. During the 1937–38 season 863 fox pelts were obtained, and a suitable number of animals were reserved for breeding stock.

The byproducts plant on St. Paul Island was again in operation and yielded 29,830 gallons of fur-seal oil and 165 tons of meal. The oil was sold in Seattle for commercial purposes, and the bulk of the meal was made available for fish food at Federal hatcheries throughout the country.

A few additions and improvements were made to buildings at the Pribilof Islands for use of natives and in the sealing industry. Roads to facilitate the delivery of sealskins from the hauling grounds to the curing stations were extended on both St. Paul and St. George Islands. A substation was established on one of the western Aleutian Islands to provide for the expansion of sea-otter investigations and patrol.

On August 10 the Bureau took over the operation of the radio station on St. Paul Island, which had been maintained previously by the Navy Department and which was transferred to the Department of Commerce under a revocable permit.

The U. S. S. *Sirius* transported the annual shipment of supplies to the Pribilof Islands and brought out the season's take of sealskins and a number of passengers. Cooperative service was rendered also by the Coast Guard in maintaining a patrol for the protection of the fur-seal herd, and in performing other important service.

Acknowledgment is made of the assistance by members of the Bureau's staff in the preparation of this document.

VISIT OF DEPUTY COMMISSIONER OF FISHERIES, AND OTHER OFFICIALS, TO ALASKA

Deputy Commissioner Charles E. Jackson sailed from Seattle for Alaska on July 1 aboard the *Brant* to inspect the Bureau's fishery and fur-seal activities. The party accompanying him on this trip included Ward T. Bower, Chief of the Division of Alaska Fisheries; Leo D. Sturgeon, of the Department of State; and Jack McFall, Assistant Clerk of the House Appropriations Committee. W. C. Arnold, representing the salmon-canning industry, joined the party at Ketchikan, whence the journey was continued westward to Unalaska, via Sitka, Kodiak, Larsen Bay, Sand Point, False Pass, and Akutan.

At Unalaska, on July 14, Messrs. Sturgeon and Arnold transferred to the Coast Guard patrol boat *Daphne* for a cruise in Bristol Bay, primarily for the purpose of observing operations of Japanese floating canneries. They arrived at Naknek on July 16, and in due time returned to Unalaska, and thence by commercial steamer to southeastern Alaska and Seattle.

Deputy Commissioner Jackson and others of the party boarded the *Penguin* at Unalaska on the evening of July 14, and on the following day proceeded to the Pribilof Islands to inspect the Bureau's sealing activities. On July 18 the *Penguin* transported the party to Naknek. After observing fishery activities in the Bristol Bay district, both by vessel and airplane, Mr. Jackson and his party crossed the portage to Iliamna Bay, on Cook Inlet, where they reembarked on the *Brant*. Stops were made at Anchorage, Seward, College Fiord, Cordova, Yakutat, Juneau, Petersburg, Wrangell, Anan Bay, and Ketchikan, and the vessel arrived at Seattle on August 8. After a visit to Port-

land and an inspection of the Bonneville Dam, Mr. Jackson left for Washington, D. C., and arrived there on August 14.

Mr. Bower left the *Brant* at Ketchikan and remained in southeast Alaska for about 2 weeks, visiting various salmon canneries and assisting in an aerial inspection of spawning grounds. Before returning to Washington he spent some time at Seattle and San Francisco conferring with members of the fishing industry in regard to Alaska matters. He arrived at Washington, D. C., on September 20.

Senator Ernest Lundeen, of the Committee on Territories and Insular Affairs, made an official tour to southeast Alaska on the *Brant*, sailing from Seattle on August 31 and returning there on September 21. Among the places visited were Ketchikan, Petersburg, Kake, Washington Bay, Warm Springs Bay, Todd, Sitka, Skagway, Haines, Taku Harbor, Hobart Bay, Port Houghton, and Wrangell.

PROTECTION OF WALRUSES AND SEA LIONS

A new (eighth) edition of Department of Commerce Circular No. 286 was issued under date of July 1, 1937, containing the laws and regulations for the protection of walruses and sea lions in Alaska. The prohibition on the killing of walruses was extended to cover the period from July 1, 1937, to June 30, 1939, and no change was made in the regulations previously in effect concerning the killing of sea lions. Walruses may be taken only by natives for food or clothing, by miners or explorers when in need of food, or by collectors of specimens for scientific purposes under permits issued by the Secretary of Commerce. Similar conditions apply in respect to the taking of sea lions, and their killing is permissible also in the necessary protection of property or while the animals are destroying salmon or other food fish.

JAPANESE VESSELS IN BERING SEA

Operations of Japanese floating plants in Bering Sea were begun in 1930 and have been carried on each season since then, primarily in the taking and canning of spider crabs.

Three such plants were operated in 1937: The *Taihoku Maru*, with 12 bottom trawlers varying in size from 75 to 150 feet; the *Toten Maru*, with 8 launches and 1 crab-trap planter; and the *Taiyo Maru*, with 3 auxiliary vessels. Of these, the *Taihoku Maru* (about 8,000 tons) engaged in the crab fishery in Bering Sea in 1930 and returned again in 1933 and in each season thereafter, its operations in later years being expanded to include the manufacture of oil and meal from bottom fish taken by trawling. The *Toten Maru*, originally the *Nagato Maru* (about 3,000 tons), had previously operated in the Bering Sea crab fishery in 1931, 1932, 1934, and 1936. The *Taiyo Maru* was employed in Bering Sea waters for the first time in 1937, apparently continuing the studies of the routes and availability of salmon in offshore waters which had been begun by the *Tenyo Maru* in 1936. The *Taiyo Maru* was observed about 20 miles west of Ugashik Bay, with its three auxiliary vessels each operating gill nets about 2 miles long.

In addition to the foregoing, the *Hakuyo Maru*, training ship of the Imperial Fisheries Institute of Tokyo, again cruised in Bering Sea for the purpose of affording practice to a group of students in deep-sea fishing, navigation, and seamanship. This vessel has a

comprehensive library and oceanographic equipment for scientific study of marine life in all its branches. There is also a small outfit for experimental canning of salmon and crabs. The captain and a party from the *Hakuyo Maru* visited St. Paul Island on July 8 to observe fur-seal life on the rookeries.

In view of the Japanese activities with respect to the salmon fishery, widespread alarm was aroused among Bristol Bay packers and others concerned lest the interception of the salmon runs bound for Alaska streams should jeopardize and ultimately destroy the long-established Bristol Bay salmon industry. Strong protests were made against the threatened encroachment on the Alaska salmon fisheries, and bills were introduced in Congress and extensive hearings were held, looking to the protection of American interests.

This whole problem has been the subject of diplomatic negotiations with the Japanese Government over a long period. As a result of these negotiations the Secretary of State announced in March 1938 that the Japanese Government has given assurances (1) that it will suspend its official survey of salmon fishing in the waters of Bristol Bay and (2) that it will continue to suspend the issuance of licenses for vessels to fish for salmon in these waters; and that if and when conclusive evidence is presented that any Japanese vessels engage in salmon fishing commercially in these waters, the Japanese Government is prepared to take necessary and proper measures to prevent such operations.

The American Government will continue to give constant and practical attention to ways and means to assure the protection and perpetuation of the highly important food resource and industries involved.

FISHERY INDUSTRIES

As in corresponding reports for previous years, the Territory of Alaska is here considered in the three coastal geographic sections generally recognized, as follows: (1) Southeast Alaska—embracing all that narrow strip of mainland and the numerous adjacent islands from Portland Canal northwestward to and including Yakutat Bay; (2) central Alaska—the region on the Pacific from Yakutat Bay westward, including Prince William Sound, Cook Inlet, and the southern coast of Alaska Peninsula, to Unimak Pass; and (3) western Alaska—the north shore of the Alaska Peninsula, including the Aleutian Islands westward from Unimak Pass, Bristol Bay, and the Kuskokwim and Yukon Rivers. These divisions are solely for statistical purposes and do not coincide with areas established in departmental regulations.

Detailed reports and statistical tables dealing with the various fishery industries are presented herewith, and there are also given the important features of certain subjects of special investigation or inquiry.

LEGISLATION REGARDING NEW HALIBUT TREATY

An act was approved by the President on June 28, 1937, giving effect to the revised convention between the United States and Canada for the Preservation of the Halibut Fishery of the Northern Pacific Ocean and Bering Sea which was signed at Ottawa on January 29, 1937, and became effective with the exchange of ratifications on July

28, 1937. The new treaty contains only two major changes from the former, namely, that the International Fisheries Commission is empowered (1) to legalize the sale of halibut taken by vessels fishing for other species during closed periods for halibut fishing and (2) to prescribe the final date of departure of a halibut boat from port instead of specifying a closing date for halibut fishing. The latter change would permit a vessel on the banks to remain at sea until a full catch is made.

The enabling act, besides giving effect to the treaty and the regulations adopted thereunder, closes markets of the United States to fish taken by any vessel not of American or Canadian registry engaged in halibut operations, and forbids the outfitting or provisioning of any such vessel by persons within the territory or jurisdiction of the United States. The act further makes it unlawful for any person within the territory or jurisdiction of the United States or any American within convention waters knowingly to possess any halibut taken, transferred, received, or brought in, in violation of provisions of the convention or the act.

ALASKA FISHERIES LEGISLATION

In August 1937 the President approved two acts further amending the Fisheries Act of June 6, 1924. The first of these, approved on August 2, 1937, authorizes the Secretary of Commerce to lease bottoms in the Territorial waters of Alaska for commercial oyster culture, while the second, approved on August 14, 1937, restricts commercial salmon fishing in Bristol Bay by means of stake or set nets to persons who have resided continuously for 5 years within 30 miles of the place where such fishing is carried on.

Oysters were first introduced into Alaskan waters in 1931, when about 40 bushels from Puget Sound were planted in the vicinity of Ketchikan. Since that time about 2,000,000 seed oysters have been planted in Alaska, and in all instances a healthy growth has been reported. It is expected that the legislation making it possible for oyster growers to gain exclusive fishery rights on oyster bottoms will give impetus to the new industry.

The new law restricting stake and set net fishing for salmon in Bristol Bay is expected to benefit the bona fide residents of that area, particularly those who are physically unfit to engage in operations with drift nets in offshore waters.

The text of the amendments is as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 1 of the Act of Congress approved June 6, 1924, entitled "An Act for the protection of the fisheries of Alaska, and for other purposes" (43 Stat. 464), as amended by the Act of Congress approved June 18, 1926 (44 Stat. 752), is further amended by striking the period after the words "Alaskan Territorial waters," where they occur at the end of the second proviso, and inserting a colon in lieu thereof and after the colon the following: "*Provided further,* That the Secretary of Commerce, in his discretion, and upon such terms and conditions as he may deem fair and reasonable, is hereby authorized to lease bottoms in Alaskan Territorial waters for bona fide oyster cultivation for commercial purposes."

Approved, August 2, 1937.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 1 of the Act approved June 6, 1924, entitled "An Act for the protection of the fisheries of Alaska, and for other purposes" (43 Stat. 464), as amended, is further amended by inserting in said section

at the end of the first proviso thereof another proviso to read as follows: "*Provided further*, That in the area embracing Bristol Bay and the arms and tributaries thereof, no person shall at any time fish for or take salmon with a stake net or set net, for commercial purposes, unless such person shall have theretofore continuously resided for the period of at least five years within a radius of thirty miles of the place where such net is staked or set:"

Approved, August 14, 1937.

NEW FISHERY REGULATIONS

The regulations for the protection of the fisheries of Alaska, issued February 8, 1937, were amended by the following regulations issued by the Acting Secretary of Commerce under the dates indicated:

[*July 13, 1937*]

PRINCE WILLIAM SOUND AREA

Salmon fishery.—Regulation No. 12 (w) is amended to read as follows: "Hinchinbrook Island: Within one-half statute mile eastward of a point on the south side of Port Etches at 146 degrees 40 minutes west longitude."

[*July 30, 1937*]

PRINCE WILLIAM SOUND AREA

Salmon fishery.—Regulation No. 10 is amended to read as follows: "Commercial fishing for salmon is prohibited during the remainder of each calendar year after 6 o'clock antemeridian August 2: *Provided*, That this prohibition shall not apply (a) to trolling and gill netting through August 22 in the waters along the western coast from the outer point on the north shore of Granite Bay (known as Granite Bay Point) to the light on the south shore of the entrance to Port Nellie Juan, (b) to trolling in the period from 6 o'clock antemeridian August 5 to 6 o'clock postmeridian September 20 in the waters of Prince William Sound east of 147 degrees west longitude, exclusive of all waters of Valdez Arm north of Point Freemantle, and (c) to the operation of set or anchored gill nets in the period from 6 o'clock antemeridian August 5 to 6 o'clock postmeridian September 20 in the waters of Valdez Arm east of 146 degrees 25 minutes west longitude. All trap leads from shore to entrance of hearts must be removed prior to 6 o'clock antemeridian August 6."

[*August 23, 1937*]

SOUTHEASTERN ALASKA AREA

CLARENCE STRAIT DISTRICT

Salmon fishery.—1. Regulation No. 6 is amended so as to prohibit commercial fishing for salmon, other than trolling, north of a line extending from Narrow Point to Ernest Point from 6 o'clock postmeridian August 26 to 6 o'clock antemeridian October 1, and for the remainder of the calendar year after 6 o'clock postmeridian October 15.

2. Regulation No. 7 is amended so as to prohibit commercial fishing for salmon, other than trolling, between a line extending from Narrow Point to Ernest Point and a line extending from Approach Point to Caamano Point from 6 o'clock postmeridian August 24 to 6 o'clock antemeridian October 1, and for the remainder of the calendar year after 6 o'clock postmeridian October 15.

[*August 26, 1937*]

SOUTHEASTERN ALASKA AREA

SOUTH PRINCE OF WALES ISLAND DISTRICT

Salmon fishery.—Regulation No. 6 is amended so as to prohibit commercial fishing for salmon, other than trolling, from 6 o'clock postmeridian August 27 to 6 o'clock antemeridian October 1, and for the remainder of the calendar year after 6 o'clock postmeridian October 15.

Revised regulations effective in 1938 for the protection of the fisheries of Alaska were issued by the Secretary of Commerce under date of February 15, 1938, copies of which may be obtained, without cost, on application to the Bureau of Fisheries, Washington, D. C.

ANNETTE ISLAND FISHERY RESERVE

The Annette Island Canning Co. again operated the salmon cannery at Metlakatla, under its lease from the Department of the Interior.

Eight salmon traps were operated by the company, the total catch of which numbered 1,561,077 salmon, and 71,414 salmon taken by seines and gill nets in the waters of the reservation were purchased from natives. In addition, 1,100,965 salmon were purchased from independent operators of seines and traps outside the reserve. Of the total number of fish obtained, 142,379 were sold to other canneries, and the remainder were packed at the company's plant. In the operation of the cannery and fish traps, employment was given to 89 whites and 333 natives.

Profits to the Metlakatlan Indians of the reserve on the cannery operations for 1936, under the provisions of the lease, amounted to $73,551.83. Preliminary estimates for the year 1937 place the figure at about $111,700.

STREAM IMPROVEMENT

No special project of improving salmon streams was undertaken in southeast Alaska in 1937, but stream watchmen, in connection with their regular patrol duties, continued to clear out log jams and windfalls that impeded the ascent of salmon to the spawning beds. They also cut trails along the banks of the streams to facilitate inspection of the spawning grounds at the close of the season.

Elsewhere in Alaska, also, stream-improvement work was limited, for the most part being incidental to the patrol of the fishing grounds. In the Cook Inlet district, however, considerable work was accomplished at Cottonwood Creek and Fish Creek, together with their numerous tributary streams and lakes, through funds provided jointly by the Territory and the salmon packers of the district. These creek systems provide extensive spawning grounds for red and coho salmon, but within the last 3 years they have become infested with beaver dams, which in most cases constitute barriers to salmon migrating to the spawning grounds, if not kept open during the runs. Mr. George S. Mosier, a resident of Matanuska Valley for many years, was employed from June 21 to August 15 to keep open the various small streams connecting the lakes so that all spawning grounds would be available for seeding.

CONTROL OF PREDATORY TROUT

The destruction of trout that feed upon salmon eggs and fry was carried on, as heretofore, with funds allotted from appropriations by the Territorial Legislature and matching contributions by salmon packers of certain districts. The Territorial appropriation in 1937 for clearing streams and the destruction of predatory enemies of salmon during the biennium ending March 31, 1939, was $25,000. Most of this amount was allotted for control of predatory trout in the Bristol Bay region, where the work has been conducted for a long

period and is considered responsible for a part of the gains in the red-salmon runs in recent years.

During the year 1937 approximately $20,000 was expended in the Bristol Bay region for bounty on Dolly Varden trout at the rate of 2½ cents per fish. The Bureau maintains a staff of five representatives in this district, one in each watershed, to receive, count, and destroy the trout tails presented and to issue the vouchers upon which payments are made by the Territorial Treasurer. Only bona fide residents of the district are engaged in the taking of trout, and the bounties provide an important means of livelihood during the winter.

A bounty of 2½ cents each was paid, also, for Dolly Varden trout taken in the Kasilof River, English Bay stream, and the red salmon streams on the east coast of Kalgin Island, in the Cook Inlet area. It was deemed advisable to confine efforts in this district to a few streams in order to determine what the possibilities may be. The total number of trout tails from these streams for which vouchers had been made to August 27, 1937, was 8,888. It is anticipated that a much greater interest in the work will be taken by the local residents during the 1938 season.

The destruction of Dolly Varden trout was carried on in the Kodiak area in streams in which weirs were operated. Traps built of fine mesh wire were installed in connection with the weirs and were very effective in catching the trout. During the year 81,539 trout were caught and destroyed at Karluk, 95,795 at Red River, and 40,803 in Olga Bay streams.

In the Kodiak area studies were undertaken to develop further information in regard to the migratory habits of Dolly Varden trout. At the Karluk weir site, during the seaward migration, 4,709 trout were tagged by inserting a numbered metal tag in the body cavity, and 427 trout were marked by removing the adipose and right ventral fins. Traps for the capture of upstream Dolly Varden migrants were maintained from July 16 to September 9; the catch was examined for the presence of marked and tagged fish, and 626 specimens were preserved for future study. Of the upstream migrants, 966 were tagged and released. At the Red River weir 1,862 Dolly Varden trout were marked and released during the seaward migration, and later in the season 330 marked specimens were taken from the upstream migration and preserved for future study. Of the upstream migrants at Red River, 1,600 were marked and released. These tagging experiments and studies will be continued in the following season, with a view to determining the effect of predatory control work in one stream on the trout populations of adjacent streams, in order to provide a guide for a rational control program.

STREAM MARKING

Before the opening of the commercial salmon-fishing season, and during the course of the regular patrol, markers showing closed areas and the closed waters off the mouths of salmon streams were inspected in all districts. Repairs and replacements were made whenever necessary, and positions were altered or new markers erected to conform with changes in the regulations.

The warden on the west coast of Prince of Wales Island reported that as a result of having placed new markers at least 12 feet from

the ground in 1936 and having removed the lower branches of the trees on which such markers were nailed, the number of defaced and missing markers that had to be replaced in 1937 was greatly reduced.

In the Kodiak area the anchoring of two buoy kegs 100 yards off the mouth of Karluk River to designate the boundary of the closed waters proved very helpful in preventing fishing in the restricted area. Similar buoys anchored off the mouth of Red River likewise were effective in preventing illegal fishing. The fishermen know that if they are found operating inside the buoy markers they cannot claim it was without their knowledge and intent because of inability to judge their distance by the markers on shore.

STREAM GUARDS

The Bureau employed 165 men in 1937 as stream guards, weir operators, and special workmen in connection with law-enforcement duties. Of these, 84 were stationed in southeast Alaska, 53 in central, and 34 in western Alaska. Some of the workers were engaged for only a few days, but the average period of employment ranged from 2 to 5 months.

In southeast Alaska 34 stream watchmen furnished their own launches and were assigned to patrol larger bodies of water or in the vicinity of several streams.

In central Alaska 10 guards were stationed in the Seward-Katalla district, 9 on Cook Inlet, 23 in the Kodiak-Afognak district, 4 at Chignik, and 7 in the Ikatan-Shumagin district. Nine of these guards, most of whom were in the Seward-Katalla district, furnished their own launches.

In western Alaska 33 were on Bristol Bay and 1 in the Yukon-Kuskokwim district.

There were also 8 special employees engaged in scientific work—2 on herring and 6 on salmon investigations, this work being carried on in southeastern and central Alaska.

In addition, there were 12 statutory employees, 49 men on the Bureau's vessels, and 2 on the chartered boat.

The foregoing makes a grand total of 236 persons identified with fishery protective work in Alaska in 1937, as compared with 249 in 1936.

VESSEL PATROL

Fourteen vessels of the Bureau were engaged in the Alaska fisheries patrol in 1937. Of these, the *Auklet*, *Kittiwake*, *Merganser*, *Murre*, and *Widgeon* were used in southeast Alaska; the *Eider* was in the Kodiak area; the *Ibis* at Chignik; the *Red Wing* in the Alaska Peninsula area; and the *Coot* on the Yukon River.

The *Blue Wing* assisted in replacing stream markers in the Ketchikan district, southeast Alaska, for a short time in the spring, and during the remainder of the season patrolled Prince William Sound. After being used in herring-tagging operations in southeast Alaska in the spring, the *Teal* carried on the patrol in Cook Inlet from May to August, inclusive, and participated in the patrol on Prince William Sound during most of the month of September. At the beginning of the year the *Crane* was in the service of the Post Office Department until February 4, transporting mail between Seattle and Juneau during the maritime strike. The *Crane* carried Bureau employees and

supplies to Bristol Bay in May, and then patrolled the Alaska Peninsula area until the 1st of August, when it returned the Bristol Bay crew to Seattle.

The *Scoter* patrolled the Bristol Bay area during June and July. On August 5 it relieved the *Crane* in the Alaska Peninsula area, and after the close of the fishing season there it was used in the Kodiak area from about the middle of August to September 17. En route south the *Scoter* assisted with the stream inspection on the west coast of Prince of Wales Island before returning to Seattle. The *Scoter* engaged in the fur-seal patrol off Cape Flattery, Wash., for about 2 weeks in the latter part of March and the first of April, during the northward migration of the Alaska fur-seal herd.

The *Brant* was used for the most part in general supervisory work, making five round trips between Seattle and Alaska during the year. Except for the cruise to the westward as far as Dutch Harbor in July, with the Deputy Commissioner's party, the *Brant's* work in Alaska was confined to the southeastern district. The vessel participated in the patrol and survey of spawning streams during the fall season.

As in the previous year, four speed boats were in operation, one each on Bristol Bay, in Prince William Sound, in the Wrangell district, and in the vicinity of Juneau. Nine other small power boats also were in use, including a number of skiffs equipped with outboard motors. Of these, four were used on Bristol Bay, two at Kodiak, one on Cook Inlet, one in the Seward-Katalla district, and one on the west coast of Prince of Wales Island.

In addition to the foregoing, the *Wingham* was again chartered for patrolling the Copper River flats and, at the close of activities there, for use in the general patrol and examination of salmon streams in Prince William Sound. A gas boat was chartered to patrol Uyak Bay, in the Kodiak area, during the pink-salmon run. In the Alaska Peninsula area the *Alasco II* was lent to the Bureau for several days patrol of the region from Orzenoi to Pavlof Bay. A small power boat was hired to patrol the Egegik district of Bristol Bay, the boat previously used there having been condemned and sold.

AERIAL PATROL

The Bureau's use of airplanes, chartered from commercial companies for patrolling the fishing grounds, was somewhat less extensive in 1937 than in the previous year, but a number of violations of the fishery laws and regulations were detected by this means. Aside from the speed in making observations over large areas, perhaps the chief value of aircraft as an auxiliary to the vessel patrol is that it acts as a deterrent to illegal operations, both because the fishermen do not know which plane may be engaged in the air patrol and because they have insufficient time to adjust their apparatus at the approach of an investigator.

The aerial patrol in 1937 was carried on in Bristol Bay, in Prince William Sound, and in the Juneau and Ketchikan districts of southeast Alaska, chiefly during closed periods. Airplanes were used at times, also, for the inspection of the spawning grounds and for transporting Bureau officials to isolated districts. During the 1937 season 9,335 nautical miles were traveled in these activities, on 31

days, the total flying time amounting to 91 hours. In addition, transportation was provided during regular passenger flights comprising approximately 10 hours of flying time.

COMPLAINTS AND PROSECUTIONS

A floating trap of Libby, McNeill & Libby on the west coast of Prince of Wales Island in San Christoval Channel was found fishing during a weekly closed period. The watchman stated that he had opened it at 6 p. m. on Sunday, thinking that the weekly closed period was the same for salmon as for herring fishing. Upon trial in the local Commissioner's court the company's superintendent pleaded guilty to illegal fishing and a fine of $1,000 was imposed.

Operators of six trolling boats were tried in Commissioner's court and convicted of fishing during a weekly closed period off Granite Point, Baker Island. In the case of the *Voyager*, the two fishermen were fined $25 each, and fish aboard the boat were seized and sold for $120. Similar fines were imposed on two fishermen on the *Leda*, and sales of seized fish from that boat also brought $120 for the account of the Government. Fines were placed at $50 each in the case of the trolling boats *Traveler II* and *Helen A*, and $125 in the case of the *Valid*. The operator of the last-named boat did not proceed to Craig when ordered, but resumed fishing on the following day, although fully aware that he had violated the regulations. Two fishermen on the *Gravina* were assessed $150 each, a higher fine being imposed because they disregarded instructions and proceeded to Wrangell to sell their catch before appearing in the Commissioner's court at Craig to answer charges of illegal fishing.

Fourteen seine boats in southeast Alaska were apprehended for illegal fishing, and the operators were tried in Commissioner's court. Of these, six men on the *St. Joseph* were fined $100 each for fishing after the close of the season within 500 yards of a salmon stream in Mink Bay, and five men on the *Tennessee* were fined $40 each on similar charges, this being their first offense.

The *Souvenir* and *Rikka R* were found fishing in closed waters within 500 yards of the mouth of a salmon stream—the former in Port St. Nicholas and the latter in Keete Inlet, and the *31A125* was using a short seine in Klakas Lake stream. Live fish in the seines were returned to the water, and no salmon were confiscated. Each of these three boats had a crew of four, and fines totaled $600, or $50 for each fisherman. A fine of $50 was assessed in the case of the seine boat *Bear* for using a seine shorter than the specified minimum length permitted. Five operators on the *Peter A* were fined $100, or $20 per man, for fishing in closed waters inside the markers of Big Salt Lake. A short seine, 35 fathoms, was found in Klakas Lake stream, the owner of which was not apprehended. This and other short seines found in use by fishermen along the west coast of Prince of Wales Island were confiscated and destroyed.

Three fishermen on the *Ramona* were fined $25 each for fishing in closed waters at the mouth of a salmon stream about 1 mile south of Cape Strait, Frederick Sound, and five men on the *Grace* were fined a total of $125 and costs of $40.80 for fishing in Tom Creek, Bradfield Canal. Three purse-seine boats, the *Emerald*, *Howard B*, and *Nebraska*, were seized for fishing in a weekly closed period in

Pleasant Bay, Seymour Canal. The defendants pleaded guilty in Commissioner's court and fines of $200 for each boat were imposed. The operator of the *Ovin* was fined $515 for a similar offense and for attempted bribery of the stream guard who made the arrest.

A case against operators of the seine boat *New England,* charged with fishing commercially in a closed area in Saginaw Bay, was tried in the Commissioner's court at Juneau and dismissed because of insufficient evidence.

Two gill-net fishermen, operating the boat *31B172* in the Wrangell district, were found guilty on two counts—fishing in a closed area in Kah Sheets Bay and blockading a stream with staked gill nets. Fines of $100 on each count were assessed against each operator, and costs amounted to $18.60, making a total of $418.60 for fines and costs. Fish aboard the boat were seized and sold for $71.59.

The halibut boat *Bremerton* was found fishing in closed waters off Noyes Island on Sunday July 25. The case was tried before the United States Commissioner at Craig, and a fine of $750 was assessed and paid. The halibut boat *Reliance I,* of Ketchikan, was fined $800 in Commissioner's court at Sitka for violation of the halibut fishing regulations. The vessel had cleared for fishing in Area 3 and was found fishing in Area 2 by the Coast Guard cutter *Haida.*

Charges were brought against the Lindenberger Packing Co. of Craig for canning salmon that had been out of the water more than 48 hours. The case was still pending at the end of the year. Another case still pending is that against Frank Richardson, charged with fishing with a small seine in closed waters in the Wrangell district.

In the Seward-Katalla district 12 gill-net boats were apprehended for illegal fishing; upon trial in the Commissioner's court convictions were obtained in all cases, and fines were assessed and paid. Operators of four of the boats in question (*T–385, 31B778, 31C269,* and Pioneer Canneries Co. boat *No. 42*) were found guilty on each of three counts—fishing in a closed period, in closed waters of Bering River or Bering Lake, and with stake nets, a prohibited type of apparatus in the locality; fines of $75 each were assessed against the fishermen, or a total of $450. Sales of salmon seized from three of the boats brought $213.50 for the account of the Government.

Two fishermen on the *Queen* (*31A802*) also charged with a triple violation were convicted on two counts, fishing in a closed period and and in closed waters of Bering River, about 6 miles above Point Hey, and were fined $50 each. The catch aboard the boat was seized and sold for $60.20. One of the fishermen was later arrested and fined $50 for fishing without a license, in violation of Territorial law.

The operator of the *31C287* was fined $25 for fishing in a weekly closed period and his catch was seized and sold for $19.60. Another fisherman, on the *31B547,* was fined $50 for fishing in a closed period and in closed waters in Bering River; his forfeited catch was sold for $63. Fines of $35 against the operator of the *T3951* and $25 each against two operators of the *31B869* were imposed for fishing in a weekly closed period off Russian Slough, and fines of $25 each were assessed against the operators of Pioneer Canneries boat *No. 17* and a skiff for fishing within 500 yards of the Grass Banks at Russian Slough. The operator of the *30J56* was fined $25 for fishing above markers fixing closed waters west of Cottonwood Point.

Three set gill nets, the owners of which were not apprehended, were found fishing inside Walhalla Slough. The nets and fish were confiscated, and the latter were sold for $26.35.

One prosecution was brought for the taking of undersized clams in the Cordova district. The defendant pleaded guilty before the United States Commissioner and paid a fine of $25. The illegal catch of clams was sold for $16.50 for the account of the Government.

A charge was brought against the Premier Salmon Co. for having a floating trap located on a site in Port Etches not open to trap fishing. Upon investigation it was found that a mistake had been made in the regulations describing the area in which trap fishing was permissible and in which this company's trap had been operated continuously for a number of years. Regulations were amended to properly describe this trap site and the charges were dismissed.

Considerable dispute had arisen in the last year or two at the opening of the fishing season regarding gill-net locations in the Red River area, chiefly in the vicinity of Bumble Bay, where certain fishermen have been unwilling to comply with the practice formerly adhered to, that an individual's right to a location he had operated in the previous year would not be usurped if he were on hand at the opening of the season to resume fishing at that place. When the warden found a number of gill nets in Bumble Bay too close together on the day the fishing season opened, the operators were given 1 hour to come to an agreement among themselves as to which should move in order to maintain the required distance interval between the nets, and the proper adjustment was made without court action. Later in the season two gill nets were found fishing in Bumble Bay during a weekly closed period. The owner of one of the nets was arrested and taken before the Commissioner's court at Kodiak, where he pleaded guilty and was fined $50. The owner of the other net was not found, and the net was turned over to the United States marshal for public sale.

In the Cook Inlet area two native fishermen were arrested for fishing on Salamato Beach with gill nets less that the required 600 feet apart. They were tried before the Commissioner at Kenai and fined $20 each. A fisherman in outboard power dory *31C530* was found fishing in the vicinity of Kenai River with a drift gill net 139 fathoms long, or 39 fathoms in excess of the maximum length permitted on any one boat in this area. Upon trial in the Commissioner's court the defendant pleaded guilty and was fined $100. His catch of 67 red and 1 king salmon was seized and sold for Government account. Two cases involving three gill-net operators charged with fishing in a weekly closed period were tried before the United States Commissioner at Anchorage: a joint fine of $50 was imposed on two partners, and the individual operator likewise was fined $50.

In the Bristol Bay area two fishermen were apprehended for laying out gill nets from a skiff that was being towed by a power boat near Clarks Slough. They were taken before the Commissioner's court at Snag Point, where they pleaded guilty and were fined $80 each, or 40 days in jail. The fines were paid, and the boats, nets, and fish were returned to the operators.

Two fishermen on the Alaska Packers Association's boat *No. 44* were arrested on July 17 for using gill nets of illegal sized mesh.

Trial was before the United States Commissioner at Koggiung, who imposed fines of $150 each, ordered the illegal gear destroyed, and denied the violators the right to fish during the remainder of the season.

Four fishermen on two gill-net boats belonging to the Alaska Packers Association were fined $50 each for fishing in a weekly closed period. Cases against four others operating two boats of the Red Salmon Canning Co. in a similar offense will be tried in 1938, as the men had left for the States before the United States Commissioner could handle the matter at the close of the 1937 season. Ten gill-net boats of the Nakat Packing Corporation were seized for fishing in closed periods. Upon trial before the United States Commissioner the 20 fishermen involved were found guilty and fined $35 each, which fines were suspended. Two fishermen operating the Alaska Packers Association's boat *No. 43J* were arrested for laying out drift nets less than 100 yards from the gear operated by another of the company's boats about one-half mile below Koggiung Channel light. The case was heard before the Commissioner and discharged.

A case against the operators of the Alaska Packers Association's boat *No. 35* for fishing with a set net in a closed area on the north side of Kvichak Bay was tried and dismissed by the local Commissioner. Another case of this nature against two fishermen operating boat *63J* of the Alaska Packers Association will be tried next season, as the men had left for their homes on Iliamna Lake before the case could be brought before the Commissioner. Two cannery shoresmen, found placing a net in the mouth of Prosper Creek, Kvichak Bay, were charged with fishing without a Territorial license, in a closed period. Upon trial by the Commissioner the case was dismissed.

ROBBERY OF FISH TRAPS

Four Ketchikan men charged with the robbery of salmon from traps of the Pacific American Fisheries, Inc., and the Astoria & Puget Sound Canning Co., in the Icy Strait region during the 1937 season were tried in the Federal District Court at Juneau and found guilty. Two of the men were sentenced to 5 years each, and the others to 3 years each, in the Federal penitentiary.

TERRITORIAL FISHERY LEGISLATION

At its biennial session in 1937 the Alaska Legislature amended the act of 1935 concerning the establishment of an Alaska planning council for making investigations in regard to the resources of the Territory and recommendations for the conservation, utilization, and development of such resources. The modified act outlines additional duties of the council members and appropriates the sum of $15,000 for the work.

Another act provides for the establishment of a fisheries experimental laboratory in the Territory to aid in developing the unutilized fisheries resources, and particularly to encourage the processing and marketing of such fisheries during the fall, winter, and spring, thus overcoming the handicap of short seasonal employment now suffered in fishing centers. This act also provides for the establishment of a fisheries experimental commission, consisting of the Governor of Alaska, the Alaska agent of the Bureau of Fisheries, and a third

member to be appointed by the Governor, which commission shall select a supervisor of the laboratory, obtain a suitable site and buildings, acquire necessary scientific instruments and equipment, and hire technical and clerical assistants, the amount to be expended for the site and buildings not to exceed $8,000 and for the instruments and equipment, $6,000. The sum of $20,000 to carry into effect the provisions of the act was appropriated, with the proviso that it be made available when the United States, or some department or agency thereof, shall match or agree to match the amount in cash, equipment, or services.

An act was passed repealing subsection 9 of section 3138 of the Compiled Laws of Alaska for 1933, which provided for a tax on fish buyers dealing in fresh fish.

Appropriations for the payment of bounty on hair seals, in order to prevent their increase and the consequent danger to the maintenance of valuable fisheries, amounted to $10,000 to cover a deficiency in the appropriation for the biennium ending March 31, 1937, and $40,000 for the succeeding biennium. The sum of $25,000 was appropriated for clearing streams so as to improve conditions for the natural propagation of salmon.

TERRITORIAL LICENSE TAX

Fisheries license taxes were collected by the Territory under the general revenue law of 1921, as amended in subsequent sessions of the Territorial Legislature. A statement from Oscar G. Olson, Territorial treasurer, under date of May 28, 1938, gives the collections made to that date for the year 1937, representing the taxes on operations of the previous year. It was stated that collections under the several schedules were fairly complete, although a few of the fisheries companies had not yet made full settlement.

Fishery license taxes collected by Territory for fiscal year ended Dec. 31, 1937

Schedule	Division No. 1	Division No. 2	Division No. 3	Total
Salmon canneries (pack)	$114,825.86		$453,928.61	$568,754.47
Clam canneries	1.05		337.62	338.67
Salteries	1,895.99	$49.40	674.14	2,619.53
Cold-storage plants	1,300.00	10.00	10.00	1,320.00
Fish-oil works and fertilizer and fish-meal plants	16,299.16		24,134.59	40,433.75
Whale oil and fertilizer stations			9,436.50	9,436.50
Fish traps	53,600.00		38,350.00	91,950.00
Trap catches in excess of 100,000 fish	10,048.64		21,616.22	31,664.86
Gill nets	414.40		4,495.18	4,909.58
Seines	5,482.00		2,516.00	7,998.00
Total	203,867.10	59.40	555,498.86	759,425.36
Salmon canneries (net income), not possible of segregation as to judicial division				27,921.70
Total collections				787,347.06

KUSKOKWIM RIVER

The Bureau had no stream guard stationed on the Kuskokwim River in 1937, and reports of operations there are fragmentary. It is understood that the catch by natives in the district was about normal. Robert Gherkie again engaged in commercial fishing and shipped 7,200 pounds of pickled king salmon to the outside market. Upon the basis of the average for the last 4 preceding years, 329 natives fished

in the river for local food requirements, using 290 gill nets of 4,900 fathoms, 45 wheels, and a number of small boats; their estimated output was 349 tons of dried chums.

YUKON RIVER

Only two outfits on the Yukon River engaged in salting salmon for the outside market—the Northern Commercial Co. in Acharon Channel and St. Mary's Mission at the head of Sunshine Bay. All fish handled by the former were taken in gill nets outside the mouth of the Yukon by native fishermen. The catch of the mission was by wheels in the river.

Inspector Calvin F. Townsend and Stream Guard Charles McGonagall patrolled the district aboard the *Coot*. The vessel was launched from the Government ways at Nenana on May 18, but lay at the dock until May 27 waiting for the Yukon River to clear of ice. When the *Coot* began the journey downstream, the Tanana River was very high and in many places over its banks, making navigation extremely difficult.

The ice in the Tanana River at Nenana started to run on May 12 and continued until May 17, with the highest stage of water ever known at a break-up. About 20 miles below Nenana the ice jammed, raising the river until the streets of Nenana were about 2 feet under water. After 5 days the ice broke, but it jammed again at the mouth of the Tanana River and held until May 25, flooding the whole country. Nearly every fish camp along the Tanana and Yukon Rivers for a distance of about 200 miles was either washed away or broken up by the ice.

The high water, resulting from an unusually heavy fall of snow during the winter, continued through June and July and was one of the main causes of the light catches of salmon at the various fish camps. At three places—Pilot Station, Bishop Mountain, and Ruby—the catches were normal, which is accounted for by the fact that the river is confined to one channel at these points. Elsewhere there are many channels and sand bars, and owing to the high stage of the river the salmon did not follow their usual course but kept in the shallower water on the side of the river opposite from the location of the fish wheels. Many wheels were broken by drift wood. In any case the wheel is practically useless during high water.

As a result of the light catches there will be a shortage of salmon for men and dogs in many places. However, white fish and black fish are available there in quantities. After the river lowered in the fall some natives and whites took fairly good catches of salmon in their fish wheels, but most of the men had gone to the hills to hunt caribou.

The first king salmon were caught at the mouth of the river on June 11. The best catch was on June 19, but the runs were light throughout the season. Chums entered the river at the same time as the kings, but none were taken at the saltery. As all streams tributary to the Yukon were at flood stage during the season, it is thought that many spawning beds will be left dry before the eggs have a chance to hatch. Very few beluga whales were observed this year; generally hundreds of them follow the salmon runs up the river. Although good runs of kings and chums usually enter Kwiguk Slough, almost no salmon were found there this summer. In 1927 the run at that place

was a failure, and after an examination of the channels in the following year the scarcity was attributed to the fact that the mouths had filled with sand.

Products of the Yukon and Tanana fisheries, including those shipped to the outside market, were as follows: 60 cases of king salmon canned; 126 tierces of mild-cured kings; 1,000 pounds of kings and 2,900 pounds of chums pickled; and 225 tons of chums dried. Apparatus consisted of 210 wheels, 112 gill nets of 1,311 fathoms, 4 motor vessels of 36 tons, 7 gill-net boats, 1 scow, and miscellaneous small boats. There were 10 whites and 323 natives engaged in the fishery.

WEIRS FOR COUNTING SALMON ESCAPEMENT

As a means of determining the ratio of escape to catch and of providing data for use in connection with life-history studies of the salmon, 12 weirs for counting the escapement of salmon to the spawning grounds were operated in Alaska in 1937. This is one more than the number operated in 1936, the upper station weir at Olga Bay having been installed again after being discontinued for 4 years. In addition, a count was made at Kalgin Island Creek without the use of a rack.

Reports of the weir operations and the counts of salmon in 1937 are as follows:

Alitak Bay

The cannery station weir on Olga Bay, tributary to Alitak Bay, was ready for operation on May 1 and the first red salmon were counted through on May 29. Counting was continued through September 5, when the total escapement numbered 252,193 red salmon, 5,788 pinks, and 353 cohos.

The upper station weir was not installed before the run began, and the first count there was made on June 15. When the weir was removed on August 16, the total count consisted of 120,828 red salmon and 700 pinks. It was estimated that 25,000 red salmon had ascended the upper station stream before the weir was in operation.

Commercial fishing in the Alitak region was stopped for 3 days in the second week of August in order to permit the escapement to equal the catch. The run continued in good numbers after the commercial fishing season ended, which assured an escapement well above 50 percent of the run. During the season 40,803 predatory Dolly Varden trout were taken in traps operated in connection with the weirs.

At the beginning of the season the work was carried on by Henry B. Looff; later, A. Morris Rafn was in charge at the cannery station weir, and Harold Greer at the upper station weir, under the supervision of Warden J. Steele Culbertson.

Chignik River

The weir in Chignik River was established about 150 feet below the site used in the previous season, where the river is from 2 to 5½ feet deep and about 455 feet wide. Construction was of the usual tripod type, permitting the use of the old material. The weir contained 48 tripods, to the face of which were nailed 3 rows of 4- by 4-inch stringers, about 30 inches apart. Pickets, 2 by 2 inches, spaced 1½ inches apart, were driven into the river bed and nailed to the stringers.

Four 22-inch counting gates and one 72-inch gate for small boats were provided. A 2- by 12-inch plank walk was built along the top of the weir, and a fence of wire netting of 2- by 4-inch mesh and 72-inches in height was stretched above the pickets to keep the salmon from passing over the weir at high tide. A freshet on June 15 caused the structure to sag a little in two places, but there was no serious damage done, and the salmon could not pass through except at the gates.

The first count was made on June 1, when 15 red salmon passed upstream. Throughout the season the run was light, and when operation of the weir was discontinued at the close of September 3 the total escapement consisted of 597,298 red salmon. In addition, 8,887 cohos and 2,250 kings were counted during the season. The largest count of red salmon for any one day was 25,063, on June 21.

In order to secure an escapement of 50 percent of the salmon run, it was necessary to restrict commercial fishing in Chignik Lagoon and that part of Chignik Bay west of 158 degrees 26 minutes west longitude at three different intervals during the season. These waters were closed to commercial fishing for salmon from 6 o'clock postmeridian July 9 until 6 o'clock antemeridian July 19, from 6 o'clock antemeridian July 30 to 6 o'clock antemeridian August 2, and from 6 o'clock postmeridian August 6 to 6 o'clock antemeridian August 18. The total commercial catch from the Chignik run in 1937 was 580,990.

Warden Charles Petry was in charge of operations at the Chignik weir.

CHINIK CREEK

The weir at Chinik Creek, in charge of Rudolph H. Koch under the direction of Capt. R. L. Cole, was installed on June 24, and the first salmon passed through on July 8. Counting was discontinued on August 1, when the total escapement numbered 8,256 red salmon.

ENGLISH BAY STREAM

Construction of the weir in the stream at the head of English Bay was started on May 23 and completed 4 days later. From May 31 to August 3, inclusive, there were counted 14,857 red salmon and 174 pinks. The peak of the run was on July 10, when 1,298 red salmon passed upstream. The work at this weir was carried on by Percy G. Maltbie, under the supervision of Capt. R. L. Cole.

FISH CREEK

A weir was again established in Fish Creek on the west shore of Knik Arm, through which 50,617 red salmon and 489 cohos were counted from July 21 to August 9, inclusive. The peak of the run was reached on July 30, with an escapement of 6,351 red salmon. Under the direction of Capt. R. L. Cole, operations at this weir were carried on by Charles E. Jones at the beginning of the season, and later by William E. Conrad.

KALGIN ISLAND CREEK

A count of salmon ascending the creek on the east side of Kalgin Island was again made by the stream watchman stationed there. Such counting, without the use of a weir, is possible because the sal-

mon cannot ascend the stream except in the 2 hours before high water and for 2 hours of ebb. This season, however, the water was unusually high and of a brownish color, which made it difficult to observe the escapement accurately. From June 2 to August 6, inclusive, 20,820 red salmon were counted, and it was estimated that the escapement included also from 7,000 to 8,000 salmon that were not counted. In addition, a considerable number were observed at the mouth of the stream when the watchman was removed on August 7.

KARLUK RIVER

When the weir in Karluk River was being installed, from May 11 to May 17, the water was exceptionally low for the time of year. King salmon started to pass upstream on May 24 and red salmon on May 27, but there was no appreciable escapement until June 7, after which the run was very heavy for about 3 weeks, with the result that almost two-thirds of the season's escapement of red salmon occurred in the month of June. The largest escapement for any one day was on June 10, when 115,290 red salmon were tallied. When counting was discontinued on October 6, the total escapement numbered 1,265,003 red salmon, 15,666 cohos, 6,882 kings, and 5,738 pinks. It was estimated that 30,000 salmon were still in the lagoon at the time the weir was removed.

The large escapement at the beginning of the season was accounted for by the fact that storms wrecked apparatus and prevented fishing for a period during a heavy early run. As a result, the catch from the Karluk run never did equal the escapement. The total commercial catch of red salmon from the Karluk run was 1,028,730.

Traps for the capture of predatory Dolly Varden trout were operated as usual in connection with the Karluk weir and caught 81,539 of these fish during the season.

James O'Brien was in charge of the weir, under the direction of Warden J. Steele Culbertson.

KLAWAK CREEK

The weir in Klawak Creek, erected at the same site as in previous years, was completed on June 2. Counting began on June 4 and was continued through September 29, during which time the escapement tallied was as follows: 33,544 red salmon, 572,271 pinks, 13,625 chums, and 2,578 cohos. It was estimated that half the pink salmon and almost all the chums and cohos died at the foot of the falls above the weir because low water made it impossible for salmon to ascend the falls. Arrangements have been made whereby the Forest Service will undertake to improve these falls, probably before the beginning of the salmon run next season. L. M. Johnson was weir foreman at the Klawak weir, under the supervision of Warden Donald S. Haley.

LITTLE PORT WALTER

A weir was again operated at Little Port Walter, primarily in connection with the study of the pink-salmon runs in southeast Alaska. From August 16 to September 9 there were counted 7,085 pink salmon, 53 chums, 8 cohos, and 3 reds. On September 10 no count was made

because of high water, and the weir structure was washed out that night. It was estimated that about 2,000 salmon were in the river below the weir at that time.

ORZENOI RIVER

Construction of the weir in Orzenoi River was begun on June 2 and completed on June 8. A flood took out part of the structure on June 11, and it was not until June 17 that the work of replacing pickets and building an extra flood gate was completed. From June 19 to August 6, inclusive, there were counted through the weir 16,343 red salmon, 6,358 pinks, 1,316 chums, and 114 kings. Gordon Ashton again carried on the work at this place, under the supervison of Acting Warden Ralph A. Ferrandini.

RED RIVER

The weir in Red River was completed on May 15, and the first escapement was counted on May 23, when six king salmon passed upstream. The red-salmon run began on the following day. Counting was continued through August 28, at which time the total escapement consisted of 253,994 red salmon, 1,671 kings, and 673 cohos.

Although the catch exceeded the escapement at Red River in the latter part of July, it was not necessary to close the area at that time, as the difference was too small. However, this district was closed through the remainder of the season after August 21. During the season 95,795 Dolly Varden trout were taken in a trap and destroyed.

Tom Frost, at the beginning of the season, and later Henry B. Looff, had charge of operations at this weir, under the direction of Warden J. Steele Culbertson.

SITUK RIVER

Construction of the weir in Situk River was completed on June 11, and the first salmon passed through on the following day. Counting was continued through July 21, after which high water prevented accurate observations, and the structure was finally washed out on July 27. The total count for the season was 118,777 red salmon, 2,750 pinks, and 1,290 kings. Axel W. Tveter was in charge of operations at this place, under the direction of Warden William B. Berry.

SALMON LIFE HISTORY STUDIES

Studies of the life histories and fluctuations in the abundance of the Pacific salmon in Alaska were continued in 1937 by the staff of the Fisheries Biological Station at Seattle, Wash. The major investigations of the red salmon at Karluk and the pink salmon at Little Port Walter were carried on as formerly. Biological data on the red salmon in the Bristol Bay, Chignik, and Copper River areas were also collected. Daily catch records of the fishing boats operating in Bristol Bay from the inception of the industry up to the present time were compiled during the year.

Studies carried on at Karluk River and Little Port Walter gave further insight into the natural factors that influence the abundance of the salmon. The biological work at Karluk during the past year included studies of the influence of predatory trout on the abundance of the red salmon spawning in the river system. The

cooperative project with the National Canners Association dealing with the biological changes within the pink salmon due to sexual development was continued at Little Port Walter.

The collection, compilation, and analysis of records of the daily catch of salmon in Alaska by the principal types of fishing apparatus were continued in 1937, and provided information as to the fluctuation in abundance and time of appearance of salmon runs in the various districts. This information is of importance in determining adequate regulations for the conservation of the salmon.

OBSERVATIONS ON THE ESCAPEMENT OF SALMON

As in previous years, the size and condition of the salmon runs were closely observed in all districts during the commercial fishing season with a view to determining whether any immediate modifications of the regulations were necessary in order to assure an adequate reservation of brood fish. After the close of the season an inspection was made of representative streams in the various districts. The requirement of law that not less than 50 percent of the runs be permitted to escape was fully met in streams where counting weirs were maintained, and there was in general a satisfactory seeding of all spawning grounds.

Southeast Alaska.—In the Ketchikan district, embracing the southern district and that part of the Clarence Strait district south of Ernest Sound, the run of salmon was slow at the start, but increased later, holding up fairly steady until after the close of the fishing season, and the spawning grounds as a whole were adequately seeded. Practically all streams on the east coast of Prince of Wales Island as far north as Kasaan Bay had good escapements. Tolstoi Bay and Thorne Bay likewise had good escapements. Probably the poorest escapement in the district was in the western part of Behm Canal, although Yes Bay had a good showing. The escapement in Boca de Quadra and Smeaton Bay was excellent. Some of the smaller streams had a fair escapement, and a few were poorly seeded. From the number of salmon observed in bays of Annette Island and Gravina Island after the close of the fishing season it was apparent that the spawning grounds in tributary streams would be well seeded.

The stream survey in the Wrangell district and adjacent waters of Sumner Strait and the northern part of Clarence Strait, while not as thorough as desired, was fairly comprehensive and showed that the escapement in general was rather light, notwithstanding favoring conditions, such as unusually heavy rainfall and consequent high water in the streams. For the region as a whole it was a season of small and detached runs. In western waters of Sumner Strait, off the eastern shores of Kuiu Island, sizeable runs of pink salmon began about August 7 and reached their peak 10 days later. This locality (including Rocky Pass, Threemile Arm, Seclusion Harbor, and Affleck Canal), together with Totem Bay on the south shore of Kupreanof Island, was the only part of Sumner Strait that had a good run of pinks. Toward the close of the season there was a fair run of pink salmon in Whale Passage. A fairly good run of this species occurred also in the Stikine district, reaching its peak during the last 2 weeks of July. The run of pink salmon in streams of Bradfield Canal was unaccountably small, in view of the large escapement there in 1935. There was an excellent run of king salmon in the Stikine district and a good escapement.

This region also had a good run of red salmon. Other red-salmon streams that had good escapements were those tributary to Salmon Bay and Lake Bay. Barrie Creek had a meager escapement of both reds and pinks. The runs of chums and cohos were light throughout the Wrangell district.

The run of pink salmon was very late on the west coast of Prince of Wales Island, not appearing in any volume until the middle of August, and then the run was irregular. At no time was there a steady run in any locality. Pink salmon began striking into the bays and inlets of the South Prince of Wales Island district about August 29. During the stream examination in September if was found that the run had increased and as a result of the heavy rains the fish immediately entered the streams, assuring a fair escapement of this species. The northern part of Prince of Wales Island, however, including tributaries of Sumner Strait, and streams of Tuxekan Passage, El Capitan Passage, Calder Bay, Sea Otter Sound, and Davidson Inlet, had a very poor escapement of pink salmon, and of other species as well. There was a fair escapement of red salmon in Sarkar Lake, in Klawak Creek, and in various red-salmon streams in the South Prince of Wales Island district. The runs of cohos and chums were very disappointing all along the west coast of Prince of Wales Island.

In the Icy Strait district salmon were not plentiful during the first part of the season; but the run increased gradually, reaching its peak about July 20 and holding up fairly well until the end of the season. In the eastern and western districts there was a poor showing of salmon until August 4 and a good run thereafter until the close of the season. The run in Stephens Passage was one of the heaviest in years. Reports of stream guards indicate that red-salmon streams of these districts were fairly well seeded, and that the pink-salmon escapement was good in some areas and poor in others, being ample in the Icy Strait district as a whole, fair along the west coast of Admiralty Island south of Killisnoo, poor along the coast north of Killisnoo, and satisfactory throughout the eastern district. An excellent seeding was obtained in the mainland streams of Stephens Passage. The escapement of chums and cohos was about average in all three districts.

The curtailment of commercial fishing because of stormy weather in certain parts of the Yakutat district assured a better than average escapement. There was a fair escapement from a rather light run of king salmon in Alsek River and also a satisfactory escapement of reds and cohos. Good escapements of reds and cohos were also secured in Italio River and Ahrnklin River, and of all species in Situk River. The runs and escapements in Lost River and Ankau Inlet were fair, and Humpback Creek had the best escapement of pink salmon it has had for several years.

Prince William Sound and Copper River region.—The run of pink salmon in Prince William Sound as a whole was unusually late and very light during the commercial fishing season. This was particularly true on the eastern and southern sides, where the run was poor in most localities. On the western side the run began earlier and in some sections held up fairly well until the close of commercial fishing. The best showing in the sound was along the Chenega shore and in the Port Wells area, and the escapement there was good. Because of the generally light run a supplementary order was issued closing Prince William Sound to commercial fishing on August 2, or 3 days earlier

than originally specified. An improvement in the run during the last week of the fishing season gave promise of a fair escapement for the entire district, and one materially larger than in any other recent odd year.

A larger run of red salmon than usual entered the Copper River, the main run appearing from June 8 to 15. In Bering River the main run was from June 20 to 26. Few fishing boats were engaged in taking fish from the latter run, and stormy weather hampered operations for the first 3 weeks of the fishing season on Copper River. Reports indicated that the escapement of reds and kings in the tributaries of Copper River was the best it had been for several years.

In the Resurrection Bay area red salmon were small and the run was light, somewhat similar to the poor run in 1930. A fair run of cohos began on September 11 and continued until the latter part of the month. Stormy weather prevented fishing during this period, and as a result there was a good escapement of this species.

Cook Inlet.—In general the runs of all species of salmon in the Cook Inlet area were later than usual, with the possible exception of chums. Few king salmon were in evidence prior to the opening of commercial fishing on May 25, but the run held up well throughout the season, reaching its peak between June 12 and 19. While the catch of king salmon was the largest on record in the district, there was no notable increase over former years in the number of this species observed on the spawning grounds visited, mainly on the Kenai and Kasilof Rivers.

The early run of red salmon was light, but a second run appeared on July 24, much heavier than the first, with the greatest number of fish centered near the mouths of the Kenai and Kasilof Rivers. The latter run continued in fair numbers until several days after the close of the fishing season. An excellent escapement of red salmon was observed on the spawning grounds of the Kenai and Kasilof Rivers, particularly of the latter, where, with the exception of one stream all tributaries were seeded to capacity. A good escapement also entered the Kalgin Island stream. At Fish Creek, Knik Arm, the escapement of red salmon was approximately 75 percent less than in the previous year. The escapement at English Bay and Chinik Creek was disappointing, particularly that in the latter stream, which was the poorest since improvement was started on the falls at the mouth of the stream in 1926. Prior to that time it was impossible for salmon to ascend these falls, except during a short interval on the higher tides. Since the falls were improved the salmon may enter this stream even during the smallest tides.

The pink-salmon run, while spotted, averaged good for the odd year. In the Port Dick region, where the runs of pinks and chums were heaviest, the escapement was very good. Streams on the outer coast from Point Gore to Port Chatham had a fair seeding. There was also a fair escapement of pinks at Seldovia Bay and Tutka Bay. In other streams south of Anchor Point, including Kachemak Bay, the escapement was light.

Kodiak area.—Enormous runs of pink salmon entered Uganik Bay and Uyak Bay, and this species was abundant also in other parts of the Kodiak area, particularly in Alitak Bay and waters along the east coast of Kodiak Island. A good escapement of pinks was observed in all streams examined at the close of the season. The streams were well supplied with water, and the salmon had no difficulty ascending to

the spawning grounds. Red salmon in the district as a whole were less plentiful than in the previous year, and the runs were irregular. At Olga Bay the escapement of this species was the best for several years, the escapement at Karluk was fair, and that at Red River was below the average. The runs and escapements of other species were fair.

Chignik.—The run of red salmon in Chignik River was very light throughout the season and the required 50-percent escapement was obtained only by additional curtailment of commercial fishing. The run of pink salmon was unusually good for this district and was the largest since the season of 1926. The runs and escapements of chum and king salmon were a little above the average, and the run and escapement of cohos was very light.

Alaska Peninsula.—As in the previous year, the heaviest run of red salmon on the south side of the Alaska Peninsula in 1937 occurred in the last 2 weeks of June, while on the north side of the peninsula the peak of the run was about the middle of July. Red salmon in this district were never abundant throughout the season, and the runs and escapements of cohos and kings were also small. There was an exceptionally heavy odd-year run of pink salmon, which continued strong after the close of the fishing season, assuring an adequate seeding of the spawning beds. The run of chums was good.

Bristol Bay.—The run of red salmon in Bristol Bay as a whole was light at the beginning of the season but later developed into very good volume. The Nushagak district had the best run in nearly two decades, the fish arriving in large numbers on June 29 and continuing until the middle of July, when there was a tapering off of the larger schools. In the Kvichak-Naknek district the main run occurred after July 10, and the peak of the run in the Egegik district was from July 16 to 20. The season at Ugashik was still later, with few fish until July 20, after which there was a heavy run, reaching the peak of abundance on July 22, and continuing in good numbers after the close of the season.

Comprehensive surveys, partly by airplane, were made of the various districts after the close of the fishing season. Excellent escapements were observed in the Wood River and Tikchik Lakes systems, in the Lake Clark area of the Kvichak watershed, and in Lake Brooks and Naknek Lake of the Naknek watershed. Streams tributary to Ugashik Lakes were only lightly populated with red salmon, which is normal for this area, and a number of streams in the Egegik district appeared to be seeded to but 25 percent capacity. The seeding of the spawning beds of the Bristol Bay area as a whole, however, was very satisfactory.

GENERAL STATISTICS OF THE FISHERIES

The total number of persons engaged in the fisheries of Alaska in 1937 was 30,331, or 52 less than in 1936. Fishery products were valued at $51,743,220, an increase of $1,287,948, or about 3 percent, over the value in the preceding year. Of the total amount, 90 percent represented the value of salmon products; 5.6 percent, herring; 1.9 percent, halibut; and 2.5 percent, the value of all other fishery products.

Summary of persons engaged and products of the Alaska fisheries in 1937

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Number	Value	Number	Value	Number	Value	Number	Value
PERSONS ENGAGED								
Whites	7,891		4,981		4,526		17,398	
Natives	3,495		1,745		1,360		6,600	
Chinese	93		161		302		556	
Japanese	562		251		154		967	
Filipinos	1,632		1,144		1,132		3,908	
Mexicans	17		68		549		634	
Puerto Ricans			11		79		90	
Kanakas	4		3		9		16	
Negroes	6		16		54		76	
Miscellaneous	2		31		53		86	
Total	13,702		8,411		8,218		30,331	
PRODUCTS								
Salmon:								
Canned—cases	2,933,896	$15,978,185	2,216,359	$13,717,227	1,519,410	$14,852,357	6,669,665	$44,547,769
Mild cured—pounds	5,620,800	1,051,744			100,800	12,600	5,721,600	1,064,344
Pickled—do	18,800	1,574	290,696	37,803	455,900	61,173	765,396	100,550
Fresh, for food—do	3,421,129	292,316					3,421,129	292,316
Frozen, for food—do	5,344,666	431,614					5,344,666	431,614
Frozen, for bait—do	59,750	634					59,750	634
Dry-salted and dried—do			11,725	1,900	1,148,000	79,900	1,159,725	81,800
Kippered and canned—cases	314	1,794					314	1,794
Fertilizer—pounds	1,400,000	21,000	572,000	8,151			1,972,000	29,151
Oil—gallons	51,800	15,540	26,300	8,416			78,100	23,956
Herring:								
Fresh, for bait—pounds	2,674,260	31,180	57,125	656			2,731,385	31,836
Frozen, for bait—do	2,506,787	16,980					2,506,787	16,980
Pickled, for food—Scotch cure—do	72,750	4,161	1,995,415	101,656	29,875	2,151	2,098,040	107,968
Roused for food (bloater stock)—do					10,400	385	10,400	385
Spiced—do	350	75					350	75
Meal—do	15,899,608	277,997	21,732,926	351,272			37,632,534	629,269
Oil—gallons	1,973,891	789,017	3,595,301	1,316,324			5,569,192	2,105,341
Halibut:								
Fresh—pounds	6,136,109	419,959					6,136,109	419,959
Frozen—do	6,996,102	499,750	148,117	11,850			7,144,219	511,600
Cheeks, frozen—do	1,353	70					1,353	70
Livers—do	143,500	71,750	2,500	1,250			146,000	73,000
Cod:								
Dry-salted—do			98,684	3,635	42,090	1,554	140,774	5,189
Pickled—do			34,950	1,668	5,560	468	40,510	2,136
Stockfish—do			21,090	2,861	953	152	22,043	3,013

Summary of persons engaged and products of the Alaska fisheries in 1937—Continued

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Number	Value	Number	Value	Number	Value	Number	Value
PRODUCTS—continued								
Whale:								
Oil—gallons			194,950	$109,172	520,200	$291,312	715,150	$400,484
Sperm oil—do			39,650	10,801	128,600	35,031	168,250	45,832
Fertilizer—pounds			660,000	8,730	1,750,000	24,075	2,410,000	32,805
Clam: Canned—cases	154	$977	31,646	239,415			31,800	240,392
Crab:								
Canned—do	5,854	58,982	15,707	192,266			21,561	251,248
Meat:								
Cold packed—pounds	56,598	20,510	5,449	2,316			62,047	22,826
In bulk—do			467	233			467	233
Whole in shell—dozen	551	1,152	320	640			871	1,792
Shrimp:								
Meat:								
Canned—cases			37	296			37	296
Cold packed—pounds	444,844	158,155	8,900	3,524			453,744	161,679
Frozen—do	6,567	2,627					6,567	2,627
Fresh—do			26	10			26	10
Whole in shell—do	2,110	316	50	5			2,160	321
Trout:								
Fresh—do	41,740	2,966					41,740	2,966
Frozen—do	20,259	1,882					20,259	1,882
Sablefish:								
Fresh—do	4,063	110					4,063	110
Frozen—do	1,839,137	56,576					1,839,137	56,576
Pickled—do	190,185	6,794					190,185	6,794
Livers—do	69,582	27,833					69,582	27,833
Rockfish, frozen—do	16,843	336					16,843	336
Flounder, fresh—do	180,000	4,500					180,000	4,500
"Lingcod":								
Frozen—do	743	15					743	15
Livers—do	2,264	906					2,264	906
Smelt, frozen—do	275	8					275	8
Total		20,249,985		16,132,077		15,361,158		[1] 51,743,220

[1] These figures represent the value of the manufactured product. It is estimated that the value of the catch, exclusive of whales, to the fishermen was approximately $14,238,000. The round weight of the salmon catch landed by the fishermen was approximately 593,384,000 pounds, and the corresponding figure for herring was approximately 206,446,000 pounds. The cod figures given above do not include the offshore catch from waters adjacent to Alaska, which amounted to 3,776,983 pounds of dry-salted cod and 18,940 pounds of tongues, having a total value of $188,611, landed at ports of the Pacific Coast States.

SALMON

Although the runs of salmon in Alaska as a whole were lighter in 1937 than in the previous year, they were better than average, particularly for an odd year, and the catch was the third highest on record, having been surpassed only in 1936 and 1934. The catch of pink salmon showed a marked decline in southeast and western Alaska, but was the largest ever obtained in the central district, chiefly as a result of very heavy runs in the Kodiak and Ikatan-Shumagin areas, which more than offset the decrease in Prince William Sound. It should be noted, however, that the individual fish were of smaller size than in 1936, and whereas there was a substantial gain in the number of pinks taken, the pack for the central district was somewhat less than that of the previous year. The runs of red salmon were good in southeast and western Alaska and light in most parts of central Alaska. The catch of cohos was below average, that of chums was fair, and the catch of king salmon was the largest ever taken in Alaska

The total catch of salmon decreased about 16 percent from that for 1936. By districts, the decrease was about 29 percent in southeast Alaska, about 3 percent in central, and 4 percent in western Alaska.

The apparatus operated in Alaska as a whole in 1937 varied but little from that of the previous year, the number of traps remaining the same and the number of fathoms of seines and gill nets showing less than 1 percent difference.

CATCH AND APPARATUS

The total number of seines used in the salmon industry in 1937 was 995, of which 786 were purse seines and 209 beach seines. The purse seines aggregated 118,826 fathoms of webbing and the beach seines 20,119 fathoms. The number of gill nets used was 4,115, having a total length of 296,011 fathoms. There were 170 driven and 283 floating traps—a total of 453.

Southeastern Alaska was accredited with 532 seines, or a total of 90,576 fathoms, a decrease of 20 seines and 5,509 fathoms of webbing from the number used in 1936; also with 384 gill nets, aggregating 24,960 fathoms, an increase of 25 nets but a decrease of 1,370 fathoms of webbing; and with 32 driven and 252 floating traps, an increase of 2 driven traps and a decrease of 2 floating traps, as compared with the number operated in 1936.

Corresponding figures for central Alaska show 455 seines, or 46,169 fathoms, as compared with 396 seines, or 41,749 fathoms, in 1936; 1,537 gill nets, or 99,570 fathoms, as compared with 1,522 gill nets, or 85,690 fathoms, in 1936; and 138 driven and 31 floating traps, as compared with 139 driven and 30 floating traps in 1936.

In western Alaska 8 seines, or 2,200 fathoms of webbing, were used, an increase of 4 seines and 1,200 fathoms of webbing over the number operated in 1936. There were 2,194 gill nets used, or an aggregate of 171,481 fathoms, a decrease of 136 nets and 13,072 fathoms of webbing. No traps were operated in this district.

Seines caught 28 percent of the salmon taken in 1937, gill nets 24 percent, and traps 46 percent, while lines and wheels took the remaining 2 percent.

Percentage of salmon caught in each Alaska district, by principal forms of apparatus

Apparatus	Southeast Alaska		Central Alaska		Western Alaska	
	1936	1937	1936	1937	1936	1937
Seines	33	29	30	39	2	4
Gill nets	2	3	8	8	96	95
Traps	63	65	62	53		
Lines	2	3				
Wheels					2	1

The total catch of salmon in 1937 was 109,114,923, a decrease of 20,211,280, or nearly 16 percent, from the number taken in 1936. There was a decrease of 18,048,736 in southeast, 1,121,180 in central, and 1,041,364 in western Alaska. By species, the catch of cohos decreased 806,538; chums, 3,121,124; pinks, 11,809,300; and reds, 4,651,984; while the catch of kings increased 177,666.

Salmon taken in 1937, by apparatus and species, in each geographic section of Alaska

Apparatus and species	Southeast Alaska	Central Alaska	Western Alaska	Total
Seines:				
Coho, or silver	133,710	79,530		213,240
Chum, or keta	2,777,621	979,080	65,089	3,821,790
Pink, or humpback	9,942,232	13,627,623	186	23,570,041
King, or spring	3,390	1,626	1,316	6,332
Red, or sockeye	496,763	1,358,588	737,887	2,593,238
Total	13,353,716	16,046,447	804,478	30,204,641
Gill nets:				
Coho, or silver	106,000	167,744	2,191	275,935
Chum, or keta	78,935	101,676	697,368	877,979
Pink, or humpback	607,209	684,427	50	1,291,686
King, or spring	21,791	74,036	63,067	158,894
Red, or sockeye	363,982	2,141,922	21,315,278	23,821,182
Total	1,177,917	3,169,805	22,077,954	26,425,676
Traps:				
Coho, or silver	520,517	318,367		838,884
Chum, or keta	2,699,454	1,230,091		3,929,545
Pink, or humpback	24,616,946	16,696,651		41,313,597
King, or spring	8,146	35,745		43,891
Red, or sockeye	1,326,446	3,218,875		4,545,321
Total	29,171,509	21,499,729		50,671,238
Lines:				
Coho, or silver	639,527			639,527
King, or spring	846,151			846,151
Total	1,485,678			1,485,678
Wheels:				
Chum, or keta			311,200	311,200
King, or spring			16,490	16,490
Total			327,690	327,690
Total:				
Coho, or silver	1,399,754	565,641	2,191	1,967,586
Chum, or keta	5,556,010	2,310,847	1,073,657	8,940,514
Pink, or humpback	35,166,387	31,008,701	236	66,175,324
King, or spring	879,478	111,407	80,873	1,071,758
Red, or sockeye	2,187,191	6,719,385	22,053,165	30,959,741
Grand total	45,188,820	40,715,981	23,210,122	109,114,923

CANNING

CHANGES IN CANNERIES

Comparatively few changes in operation or management of the salmon canneries in Alaska took place in 1937. In southeast Alaska the Burnett Inlet plant, formerly operated by the Alaska Pacific Fisheries, but idle since 1930, was purchased and operated by a new corporation, the Burnett Inlet Salmon Co. The Kasaan cannery of the Pacific American Fisheries, taken over from the Northwestern Fisheries Co. and idle since 1930, was also reopened.

During the fall of 1936 and the spring of 1937 the Nakat Packing Corporation replaced its cannery buildings at Waterfall and now has there one of the finest canneries in southeast Alaska. The new structures include a cannery building with power-house and machine shop, a warehouse, store and office, carpenter shop, mess and bunkhouse, main dock, and walks and runways. The cost of construction of this plant was approximately $145,000.

In central Alaska the plant at Resurrection Bay formerly known as the Seward Fisheries, Inc., was reopened and operated by Hagen & Co., after having been closed for 2 years. The North Pacific Sea Foods Co. completed and operated a new cannery at Swanport, about one-half mile from the old cannery at Fort Liscum, which was destroyed by fire in the fall of 1936. The Kadiak Fisheries Co. leased the cannery of Shelikof Packing Co. at Zachar Bay and operated it in addition to the plants at Kodiak and Shearwater Bay. The plant of the Kustatan Packing Co. at Anchorage was purchased and operated by the General Fish Co., Inc. The Northern Light Packing Co.'s plant at Mountain Slough, last operated in 1932, was taken over and operated by L. Utness.

The Naknek cannery formerly owned by Northwestern Fisheries Co. and now belonging to the Pacific American Fisheries, Inc., which had been closed down since 1931, was again put in operation. This plant is located on the north shore of the Naknek River and is known as the Nornek unit of Pacific American Fisheries, Inc. The company's Naknek plant is farther up the Naknek River and on the south shore. Before the beginning of the fishing season the Bristol Bay Packing Co. had completed one of the two new canneries which are to replace the buildings lost by fire in 1936. The plant was operated during the season with six lines of machinery. When the other cannery is completed, each will be a five-line plant.

Joint operating arrangements were again carried on by a number of companies having canneries in the same district, resulting in the closure of several additional plants in the 1937 season.

NEW CANNERIES

There were two new floating plants in the Kodiak district—the motor vessel *Commander* (282 tons), operated by Suryan's, Inc., in Moser Bay, and a large scow operated by Frank McConaghy Co., Inc., at Zachar Bay. Other new canneries were the Northern Fisheries, Inc., at Ketchikan, and the Phillips Canning Corporation at Valdez. Although the latter produced a small hand-packed output in each of the years from 1934 to 1936, inclusive, it has not been included heretofore in the list of canneries. The Gulf Packing Co., at Cordova,

and Kayler-Otness, Inc., at Petersburg—both engaged in the packing of crab meat for several years—added substantial outputs of canned salmon to their production this season and are included for the first time in the list of salmon canneries.

The Alaskan Glacier Sea Food Co. put up a small pack of canned salmon at its crab cannery at Hoonah, but this plant has not been included in the list of salmon canneries.

CANNERIES NOT OPERATED

Fifteen plants that had canned salmon in the previous year were not operated in 1937. Four of these were in southeast Alaska, eight in the central district, and three in western Alaska. In southeast Alaska those closed for the year were the Lane Bros. cannery at Moira Sound, the Seaport Salmon Co. at Ketchikan, and the plant of Demmert Packing Co. at Klawak which had been leased to Robert Lindenberger and operated as the Klawak cannery of the Ocean Packing Co. in 1936. The Hidden Inlet plant of the Nakat Packing Corporation was destroyed by fire in May 1937, and the salmon taken in its traps during the season were packed at the company's Union Bay and Waterfall canneries.

In central Alaska the plant of the Surf Canneries, Inc., at Kukak Bay, which burned down in September 1936, was not rebuilt. The plant of the Shepard Point Packing Co. at Port Ashton was engaged solely in the manufacture of herring oil and meal. Other canneries in the central district that were closed for the 1937 season were the Alaska Pacific Salmon Co. at Drier Bay, the Aleutian Fishing & Packing Co. at Sand Point, the plant of Herbert T. Domenici at Uyak, the Glacier Sea Foods Co. at Cordova, the Ninilchik Packing Co. at Ninilchik, and the Premier Salmon Co. at Stevens Creek.

The Lockanok and Nushagak plants of Libby, McNeill & Libby on Bristol Bay were closed, the company having consolidated operations at its four other plants in that area. The Pacific American Fisheries cannery at Nushagak, which was leased to Lowe Trading Co. in 1936, also was closed during the season.

The cannery of Strand-Jensen Fisheries Co. at Cordova has been dropped from the list of idle plants, as it has been dismantled and is not likely to be operated again.

The following canneries were closed during the year but may be reopened:

Southeast Alaska:

Alaska Pacific Salmon Co	Boca de Quadra.
	Chomly.
	Funter Bay.
	Pybus Bay.
Alaska Packers Association	Loring.
	Wrangell.
Alaska Sanitary Packing Co	Cape Fanshaw.
Demmert Packing Co	Klawak.
Lane Bros	Moira Sound.
Libby, McNeill & Libby	Klawak.
Nakat Packing Corporation, The	Ketchikan.
Pacific American Fisheries, Inc	Excursion Inlet.
	Ketchikan.
	Port Walter.
	Santa Ana.
Seaport Salmon Co	Ketchikan.
Karl Thiele	Lake Bay.

Central Alaska:	
Alaska Pacific Salmon Co	Drier Bay.
Alaska Packers Association	Chignik.
	Kasilof.
Aleutian Fishing & Packing Co	Sand Point.
Anderson Mercantile Co., Inc	Deep Creek.
W. G. Culver	Point McManus.
Herbert T. Domenici	Uyak.
General Fish Co	Anchorage.
Glacier Sea Foods Co	Cordova.
Gustan & Vogel	Point Possession.
Ninilchik Packing Co	Ninilchik.
North Coast Packing Co	Ninilchik.
Pacific American Fisheries, Inc	Chignik.
	Kenai.
	Unakwik Inlet.
Point Possession Fish Co	Point Possession.
Premier Salmon Co	Stevens Creek.
Redoubt Bay Packing Co	Redoubt Bay.
E. Sandvik	Swansons Creek.
Shepard Point Packing Co	Port Ashton.
Harvey J. Smith	West Foreland.
Spur Fish Corporation	Nikishka Bay.
Sunset Packing Co	Otter Creek.
John Wik	Kenai.
Jake Young	Port Chatham.
Western Alaska:	
Alaska Packers Association	Naknek River.
Herendeen Bay Consolidated Canneries	Herendeen Bay.
Libby, McNeill & Libby	Lockanok.
	Nushagak.
Pacific American Fisheries, Inc	Nushagak.
Red Salmon Canning Co	Naknek River.

TOTAL CANNERIES OPERATED

One hundred and thirteen canneries were operated in Alaska in 1937—46 in southeast, 44 in central, and 23 in western Alaska—which is the same number as in the previous year for southeast Alaska, and a decrease of 3 for the central and 1 for the western district, a net decrease of 4 plants from the number operated in 1936. The floating canneries *International*, of the International Packing Co., and *Memnon*, of the Columbia River Packers Association, Inc., were operated in both central and western Alaska, but each is credited to but one district, the former to central and the latter to western Alaska.

Companies that canned salmon in Alaska, number and location of canneries operated, and number of traps owned by each, 1937

[New canneries indicated by asterisk (*)]

Company	Canneries		Traps		
	Number	Location	Driven	Floating	Total
Southeast Alaska:					
Alaska Pacific Salmon Co	4	Kake		11	11
		Ketchikan	3	7	10
		Port Althorp		19	19
		Rose Inlet		9	9
Annette Island Canning Co	1	Metlakatla	1	7	8
ARB Packing Co	1	Wrangell			
Balcom-Payne Fisheries, Inc	1	Ketchikan			
Beegle Packing Co	1	do	2	2	4
Berg Packing Co	1	do			
Burnett Inlet Salmon Co	1	Burnett Inlet			
Consolidated Fisheries	1	Excursion Inlet	3	10	13

Companies that canned salmon in Alaska, number and location of canneries operated, and number of traps owned by each, 1937—Continued

Company	Canneries		Traps		
	Number	Location	Driven	Floating	Total
Southeast Alaska—Continued.					
Deep Sea Salmon Co	1	Skowl Arm		6	6
Diamond K Packing Co	1	Wrangell	1	3	4
Douglas Fisheries Co., Inc	1	Douglas			
Fidalgo Island Packing Co	2	Bay of Pillars	5		5
		Ketchikan	3	2	5
Haines Packing Co	1	Letnikof Cove			
P. E. Harris & Co	1	Hawk Inlet		7	7
Hood Bay Canning Co	1	Hood Bay		4	4
Hydaburg Fisheries, Inc	1	Hydaburg			
Icy Straits Salmon Co	1	Hoonah			
Independent Salmon Canneries, Inc	1	Ketchikan		1	1
Kayler-Otness, Inc	1	Petersburg [1]			
Ketchikan Packing Co	1	Ketchikan		2	2
Libby, McNeill & Libby	4	Craig	1	8	9
		George Inlet		6	6
		Taku Harbor	5	10	15
		Yakutat			
Lindenberger Packing Co	1	Craig			
Nakat Packing Corporation, The	2	Hidden Inlet [2]		6	6
		Union Bay		6	6
		Waterfall		8	8
New England Fish Co	3	Chatham		5	5
		Ketchikan		5	5
		Noyes Island		6	6
Northern Fisheries, Inc	1	Ketchikan*			
Ocean Packing Co	1	Klawak		2	2
Pacific American Fisheries, Inc	2	Kasaan	3	13	16
		Petersburg	3	4	7
Peril Straits Packing Co	1	Todd		6	6
Pyramid Packing Co., Inc	1	Sitka		4	4
Red Salmon Packers Association	1	Yakutat (floating)			
Scow Bay Packing Co	1	Scow Bay	1	3	4
Sebastian Stuart Fish Co	1	Tyee		6	6
Superior Packing Co	1	Tenakee		5	5
Ward's Cove Packing Co	1	Ward Cove		3	3
Wrangell Packing Co	1	Wrangell		3	3
Central Alaska:					
Alaska Native Consolidated Canning Co	1	Sand Point			
Alaska Pacific Salmon Co	1	Drier Bay [3]		4	4
		Sand Point	3		3
Alaska Packers Association	2	Chignik	3		3
		Larsen Bay [3]	3		3
Alaska Red Salmon Packers, Inc	1	Halibut Bay (Carmel).			
Alaska Southern Packing Co	1	Uyak Bay (floating)			
Alaska Year-Round Canneries Co	1	Seldovia	4		4
Aleutian Fishing & Packing Co		Sand Point [2]	1		1
Anchor Line Packing Co		Seldovia (floating)			
Chignik Packing Co	1	Chignik			
Columbia River Packers Association	1	Chignik [3]	3		3
		Ikatan Bay (floating).			
Cook Inlet Packing Co	1	Seldovia	7		7
Copper River Packing Co	1	McClure Bay		5	5
Emard Packing Co	1	Anchorage	7		7
Fidalgo Island Packing Co	1	Port Graham	7		7
General Fish Co., Inc	1	Anchorage	4		4
W. R. Gilbert Co., Inc	1	Point Whitshed			
Grimes Packing Co	1	Uzinki			
Gulf Packing Co	1	Cordova [1]			
Hagen & Co	1	Seward			
P. E. Harris & Co	1	False Pass	8		8
International Packing Co	1	False Pass and Ivanof Bay (floating).			
Kadiak Fisheries Co	3	Kodiak	5		5
		Shearwater Bay			
		Zachar Bay			
Libby, McNeill & Libby	1	Kenai	12		12

[1] Primarily a crab cannery.
[2] Traps only were operated, the fish being packed at other canneries.
[3] Because this plant is in the Karluk district, the location has been shown as "Karluk" for many years. Canning operations originally carried on at the Karluk site were transferred to Larsen Bay in 1911. To avoid misunderstanding, the specific location, rather than the district, will be shown hereafter.

Companies that canned salmon in Alaska, number and location of canneries operated, and number of traps owned by each, 1937—Continued

Company	Canneries		Traps		
	Number	Location	Driven	Floating	Total
Central Alaska—Continued.					
Frank McConaghy Co., Inc.	1	Zachar Bay (floating).*			
New England Fish Co.	1	Cordova	4		4
A. N. Nilson	1	Portlock			
Ninilchik Packing Co.		Ninilchik [2]	2		2
North Pacific Sea Foods Co.	1	Swanport			
Pacific American Fisheries, Inc.	3	Alitak	6		6
		Chignik [2]	2		2
		King Cove	13		13
		Squaw Harbor	3		3
Phillips Canning Corporation	1	Valdez *			
Pioneer Canneries, Inc.	1	Cordova	2	1	3
Pioneer Sea Foods Co.	1	Orca		3	3
Premier Salmon Co.		Stevens Creek [2]	2	1	3
Puget and Alaska Canning Co.	1	Seldovia			
Sandvik Hand Cannery	1	Uganik village			
San Juan Fishing & Packing Co.	2	Port San Juan	2	2	4
		Uganik Bay	4		4
Shepard Point Packing Co.	1	Shepard Point		9	9
Snug Harbor Packing Co.	1	Snug Harbor	4		4
Suryan's, Inc.	1	Moser Bay (floating).*			
Uganik Fisheries, Inc.	1	Uganik	3		3
L. Utness	1	Mountain Slough			
Washington Fish & Oyster Co., Inc.	1	Port Williams			
Western Alaska:					
Alaska Packers Association	7	Egegik River			
		Kvichak Bay [2]			
		Naknek River [2]			
		Nushagak Bay			
		Ugashik River			
Alaska Salmon Co.	1	Wood River			
Bristol Bay Packing Co.	1	Kvichak River			
Columbia River Packers Association	2	Nushagak			
		Port Moller (floating).			
International Packing Co.	1	Port Moller (floating).			
Libby, McNeill & Libby	4	Egegik River			
		Ekuk			
		Kogglung			
		Libbyville			
Nakat Packing Corporation, The	1	Nakeen			
Pacific American Fisheries, Inc.	4	Naknek River [2]			
		Nushagak River			
		Port Moller			
Red Salmon Canning Co.	2	Naknek River			
		Ugashik River			
Western Pacific Packing Co.	1	Egegik River (floating).			

[2] Traps only were operated, the fish being packed at other canneries.

LOSSES AND DISASTERS

One of the most serious disasters in the Alaska fisheries in many years occurred toward the end of September when the purse seiner *Limit*, of Storfold & Grondahl Packing Co. foundered in a gale in Chatham Strait and was lost with its entire crew of eight men.

The major property loss in the Alaska fisheries in 1937 was the destruction of the Hidden Inlet plant of the Nakat Packing Corporation by fire on May 26, before the fishing season started. The loss of buildings, equipment, fishing apparatus, boats, and supplies amounted to $268,603. Other losses by fire in southeast Alaska included the herring plant of the Red Bluff Fisheries in August and the crab canneries of Kayler-Otness, Inc., at Petersburg, and the

Salt Sea Fisheries, at Tenakee, both of which burned down in November. The total reported losses in the fisheries industry in southeast Alaska amounted to $376,240.

Operators in central Alaska reported property losses totaling $44,061, the principal item being the vessel *North Dakota*, which, with fishing apparatus, was valued at $9,900.

In western Alaska the herring saltery of the Golovin Bay Packing Co., on Golovin Bay, which had not been operated for two seasons, was burned down about the middle of October, with a loss amounting to $21,250. Other reported losses, consisting chiefly of boats and gear, brought the total for the western district to $37,742.

Twenty-one lives were lost during the year—11 in southeast, 6 in central, and 4 in western Alaska. In the southeastern district 8 fishermen and 1 transporter were drowned, 1 fisherman met death by accident, and 1 shoresman died of disease. Two shoresmen and 1 transporter in central Alaska were killed in accidents, 2 shoresmen died of disease, and 1 shoresman was drowned. In western Alaska 2 fishermen and 2 shoresmen died of disease.

STATISTICS

One hundred and thirteen canneries were operated in Alaska in 1937, or four less than in the previous year. Employment was given to 24,865 persons, as compared with 25,221 in 1936, a decrease of 356. White employees increased 311; Filipinos, 84; Mexicans, 8; Negroes, 13; and miscellaneous (Koreans, Chileans, Peruvians, etc.), 40; while natives decreased 412; Chinese, 105; Japanese, 242; Kanakas, 23; and Puerto Ricans, 30.

The total pack of canned salmon was 6,669,665 cases, valued at $44,547,769. This is a decrease of 21 percent in quantity and less than one-half of 1 percent in value from the production in 1936, when the pack amounted to 8,437,603 cases, valued at $44,751,633. Average prices of all species were considerably higher in 1937 than in the previous year, reflecting increased operating costs as a result of higher wages and increased costs of materials.

The output of canned salmon in southeast Alaska decreased from 4,076,717 cases in 1936 to 2,933,896 cases in 1937, or 28 percent; in central Alaska the decline was from 2,869,681 cases to 2,216,359 cases, or about 23 percent; while in western Alaska the output increased from 1,491,205 cases to 1,519,410 cases, or about 2 percent. By species, in Alaska as a whole, the pack of cohos declined from 222,300 cases in 1936 to 137,317 cases in 1937, or 38 percent; chums, from 1,101,083 cases to 730,832 cases, or about 34 percent; pinks, from 4,559,794 cases to 3,625,379 cases, or 20 percent; and reds from 2,502,542 cases to 2,106,669 cases, or 16 percent; while the pack of kings increased from 51,884 cases to 69,468 cases, or 34 percent.

Details are included in the following tables to show comparison of the 1937 pack with the average for the 5 preceding years, 1932 to 1936, by cases of each species and by districts. Pinks, kings, and reds show gains of about 14 percent, 38 percent, and 3 percent, respectively, over the 5-year average, while cohos declined 28 percent and chums 12 percent. By districts, the pack in 1937 increased approximately 10 percent over the 5-year average in central Alaska and 13 percent in the western district, while in southeast Alaska there was a

decrease of less than 1 percent, making a net increase of nearly 6 percent over the 5-year average for all of Alaska.

Persons engaged, wages paid, and operating units of Alaska salmon canning industry, 1937

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
PERSONS ENGAGED				
Fishermen:				
Whites	1,719	1,602	2,092	5,413
Natives	1,279	772	465	2,516
Filipinos	14	1	6	21
Mexican	1			1
Negro			1	1
Miscellaneous [1]	1			1
Total	3,014	2,375	2,564	7,953
Shoresmen:				
Whites	2,503	1,543	1,816	5,862
Natives	1,760	801	194	2,755
Chinese	88	160	299	547
Japanese	534	251	154	939
Filipinos	1,569	1,109	1,126	3,804
Mexicans	13	68	548	629
Puerto Ricans		11	79	90
Kanakas	4	2	8	14
Negroes	6	16	52	74
Miscellaneous [1]	1	31	52	84
Total	6,478	3,992	4,328	14,798
Transporters:				
Whites	914	663	454	2,031
Natives	18	57		75
Chinese	1		3	4
Kanakas		1	1	2
Negro			1	1
Miscellaneous [1]			1	1
Total	933	721	460	2,114
Total:				
Whites	5,136	3,808	4,362	13,306
Natives	3,057	1,630	659	5,346
Chinese	89	160	302	551
Japanese	534	251	154	939
Filipinos	1,583	1,110	1,132	3,825
Mexicans	14	68	548	630
Puerto Ricans		11	79	90
Kanakas	4	3	9	16
Negroes	6	16	54	76
Miscellaneous [1]	2	31	53	86
Grand total	10,425	7,088	7,352	24,865
Wages paid shoresmen	$1,975,471	$1,625,603	$1,981,636	$5,582,710
Wages paid transporters	$516,155	$443,409	$310,677	$1,270,241
OPERATING UNITS				
Plants:				
Shore canneries	45	39	21	105
Floating canneries—				
Power vessels	1	3	1	5
Net tonnage	245	3,980	2,154	6,379
Barges		2	1	3
Net tonnage		172	494	666
Total plants operated	46	44	23	113
Vessels:				
Power, over 5 tons	535	188	94	817
Net tonnage	9,919	5,808	26,274	42,001
Launches	153	239	24	416
Power dories	62	76	7	145
Gill-net boats	130	225	1,086	1,441
Seine skiffs	283	281	17	581
Other rowboats and skiffs	689	584	219	1,492
Lighters and scows	220	209	149	578
Houseboats	18	5	32	55
Pile drivers	28	34	15	77
Pile pullers	3	8		11
Rigging scows	35	7		42

[1] Koreans, Chileans, Peruvians, etc.

Persons engaged, wages paid, and operating units of Alaska salmon canning industry, 1937—Continued

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
OPERATING UNITS—continued				
Apparatus:				
Purse seines	526	249	8	783
Fathoms	89,976	26,375	2,200	118,551
Beach seines	6	183	----------	189
Fathoms	600	18,199	----------	18,799
Gill nets	375	1,485	1,769	3,629
Fathoms	24,620	97,425	164,820	286,865
Traps, driven	32	138	----------	170
Traps, floating	252	31	----------	283

Output and value of canned salmon in Alaska in 1937 [1]

Product	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Cases	Value	Cases	Value	Cases	Value	Cases	Value
Coho, or silver:								
½-pound flat	9,189	$97,464	436	$3,944	----------	----------	9,625	$101,408
1-pound flat	1,008	9,060	196	1,568	----------	----------	1,204	10,628
1-pound tall	78,328	631,983	45,144	349,122	138	$1,030	123,610	982,135
4-pound flat	----------	----------	2,878	23,744	----------	----------	2,878	23,744
Total	88,525	738,507	48,654	378,378	138	1,030	137,317	1,117,915
Chum, or keta:								
½-pound flat	2,634	16,491	3,249	19,993	----------	----------	5,883	36,484
1-pound flat	39	140	----------	----------	----------	----------	39	140
1-pound tall	501,093	2,303,746	187,266	866,211	35,456	165,033	723,815	3,334,990
4-pound flat	----------	----------	1,095	4,380	----------	----------	1,095	4,380
Total	503,766	2,320,377	191,610	890,584	35,456	165,033	730,832	3,375,994
Pink, or humpback:								
½-pound flat	31,502	216,669	1,836	12,155	----------	----------	33,338	228,824
1-pound flat	420	2,016	18	90	----------	----------	438	2,106
1-pound tall	2,111,246	10,544,503	1,475,658	7,251,025	1	5	3,586,905	17,795,533
4-pound flat	----------	----------	4,698	23,020	----------	----------	4,698	23,020
Total	2,143,168	10,763,188	1,482,210	7,286,290	1	5	3,625,379	18,049,483
King, or spring:								
½-pound flat	3,918	52,109	10,792	148,655	785	11,304	15,495	212,068
1-pound flat	1,794	17,222	3,409	43,396	1,010	13,130	6,213	73,748
1-pound tall	24,981	212,802	17,443	149,468	5,336	42,453	47,760	404,723
Total	30,693	282,133	31,644	341,519	7,131	66,887	69,468	690,539
Red, or sockeye:								
½-pound flat	55,781	759,456	68,622	892,874	25,021	315,271	149,424	1,967,601
1-pound flat	8,694	95,634	78,046	855,594	914	10,054	87,654	961,282
1-pound tall	103,269	1,018,890	312,158	3,038,350	1,450,749	14,294,077	1,866,176	18,351,317
4-pound flat	----------	----------	3,415	33,638	----------	----------	3,415	33,638
Total	167,744	1,873,980	462,241	4,820,456	1,476,684	14,619,402	2,106,669	21,313,838
Grand total	2,933,896	15,978,185	2,216,359	13,717,227	1,519,410	14,852,357	6,669,665	44,547,769

[1] For the purpose of affording fair comparison, all cases are put upon the common basis of 48 1-pound cans per case.

Output of canned salmon in Alaska, in cases, 1932 to 1937 [1]

BY SPECIES

Product	1932	1933	1934	1935	1936	Average for 5-year period, 1932–36	1937	Percentage increase (+) or decrease (−) in 1937, as compared with 5-year average
Coho, or silver:								
½-pound flat	3,442	3,367	5,785	6,822	7,309	5,345	9,625	+80.07
1-pound flat	1,763	4,657	8,283	2,833	1,335	3,774	1,204	−68.10
1-pound tall	142,970	154,544	222,049	180,522	213,656	182,748	123,610	−32.36
4-pound flat							2,878	
Total	148,175	162,568	236,117	190,177	222,300	191,867	137,317	−28.43
Chum, or keta:								
½-pound flat	624	658	2,298	1,647	1,500	1,345	5,883	+337.40
1-pound flat							39	
1-pound tall	819,932	658,131	738,343	851,281	1,099,583	833,454	723,815	−13.15
4-pound flat							1,095	
Total	820,556	658,789	740,641	852,928	1,101,083	834,799	730,832	−12.45
Pink, or humpback:								
½-pound flat	7,166	14,857	28,793	44,560	37,406	26,556	33,338	+25.54
1-pound flat			1,668	687		471	438	−7.01
1-pound tall	2,105,979	2,167,694	3,793,732	3,198,819	4,522,388	3,157,723	3,586,905	+13.59
4-pound flat							4,698	
Total	2,113,145	2,182,551	3,824,193	3,244,066	4,559,794	3,184,750	3,625,379	+13.84
King, or spring:								
½-pound flat	11,713	9,955	9,983	13,462	10,388	11,100	15,495	+39.59
1-pound flat	14,800	10,021	10,214	6,520	5,722	9,455	6,213	−34.29
1-pound tall	43,013	21,437	32,666	16,423	35,774	29,863	47,760	+59.93
Total	69,526	41,413	52,863	36,405	51,884	50,418	69,468	+37.78
Red, or sockeye:								
½-pound flat	47,707	53,638	88,051	87,498	137,219	82,823	149,424	+80.41
1-pound flat	75,524	60,052	73,430	57,693	118,090	76,958	87,654	+13.90
1-pound tall	1,979,850	2,066,593	2,466,535	664,355	2,247,233	1,884,913	1,866,176	−.99
4-pound flat							3,415	
Total	2,103,081	2,180,283	2,628,016	809,546	2,502,542	2,044,694	2,106,669	+3.03
Grand total	5,254,483	5,225,604	7,481,830	5,133,122	8,437,603	6,306,528	6,669,665	+5.76

BY DISTRICTS AND SPECIES

Southeast Alaska:								
Coho, or silver	87,038	95,805	158,527	142,493	134,722	123,717	88,525	−28.45
Chum, or keta	579,443	424,861	394,212	540,948	778,339	543,561	503,766	−7.32
Pink, or humpback	1,379,006	1,478,013	2,622,362	2,200,060	2,925,144	2,120,917	2,143,168	+1.05
King, or spring	23,624	8,146	15,594	11,108	20,505	15,795	30,693	+94.32
Red, or sockeye	138,942	81,126	104,398	159,429	218,007	140,380	167,744	+19.49
Total	2,208,053	2,087,951	3,295,093	3,054,038	4,076,717	2,944,370	2,933,896	−.36
Central Alaska:								
Coho, or silver	60,674	65,307	76,371	47,461	86,007	67,164	48,654	−27.56
Chum, or keta	147,410	207,879	313,233	302,123	296,188	253,367	191,610	−24.37
Pink, or humpback	724,051	704,538	1,199,872	1,044,002	1,603,584	1,055,209	1,482,210	+40.47
King, or spring	32,302	23,786	28,472	24,462	27,073	27,219	31,644	+16.26
Red, or sockeye	660,161	484,484	709,470	384,183	856,829	619,025	462,241	−25.33
Total	1,624,598	1,485,994	2,327,418	1,802,231	2,869,681	2,021,984	2,216,359	+9.61
Western Alaska:								
Coho, or silver	463	1,456	1,219	223	1,571	986	138	−86.00
Chum, or keta	93,703	26,049	33,196	9,857	26,556	37,872	35,456	−6.38
Pink, or humpback	10,088		1,959	4	31,066	8,624	1	−99.99
King, or spring	13,600	9,481	8,797	835	4,306	7,404	7,131	−3.69
Red, or sockeye	1,303,978	1,614,673	1,814,148	265,934	1,427,706	1,285,288	1,476,684	+14.89
Total	1,421,832	1,651,659	1,859,319	276,853	1,491,205	1,340,174	1,519,410	+13.37
Grand total	5,254,483	5,225,604	7,481,830	5,133,122	8,437,603	6,306,528	6,669,665	+5.76

[1] The number of cases has been put upon the common basis of 48 1-pound cans per case.

Relative importance of each species of canned salmon within each district in 1937

District	Coho	Chum	Pink	King	Red	Total, all species
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Southeast Alaska	3.0	17.2	73.1	1.0	5.7	100.0
Central Alaska	2.2	8.6	66.9	1.4	20.9	100.0
Western Alaska	.0	2.3	.0	.5	97.2	100.0
All Alaska	2.1	11.0	54.3	1.0	31.6	100.0

Relative importance of each district in the production of each species of salmon canned in 1937

District	Coho	Chum	Pink	King	Red	Total, all species
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Southeast Alaska	64.5	68.9	59.1	44.2	8.0	44.0
Central Alaska	35.4	26.2	40.9	45.5	21.9	33.2
Western Alaska	.1	4.9	.0	10.3	70.1	22.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

Average annual price per case of 48 1-pound cans of salmon, 1927–37

Product	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
Coho, or silver	$8.51	$7.12	$7.59	$8.26	$6.51	$4.12	$5.20	$5.23	$6.40	$6.51	$8.14
Chum, or keta	5.47	6.06	5.35	3.60	3.19	2.79	4.12	3.65	3.83	3.58	4.62
Pink, or humpback	5.87	6.56	6.06	4.17	3.46	3.14	4.52	4.10	4.14	3.94	4.95
King, or spring	11.25	11.13	11.92	13.32	9.40	5.46	7.51	6.85	8.70	7.95	9.94
Red, or sockeye	12.08	9.41	10.71	12.57	9.20	5.61	6.71	6.72	9.32	8.38	10.12

PACK IN CERTAIN DISTRICTS

Statistics of the salmon pack are again presented for subdivisions of the three main districts of Alaska, and comparison is made with similar statistics for 1936. Where the pack at a given cannery is made up of fish from more than one district, as in the case of that at certain Cordova canneries packing fish caught both in Prince William Sound and in the Copper River area or at various plants in southeastern Alaska which draw for their supply on the catch of more than one district, due segregation has been made in order to credit each district with the pack from salmon caught therein. These districts are described as follows:

WESTERN ALASKA

Bristol Bay.—The Bering Sea shore, east and north of the Ugashik River.

Port Moller and Herendeen Bay.—Port Moller, Herendeen Bay, and Nelson Lagoon.

CENTRAL ALASKA

Ikatan-Shumagin Islands.—False Pass, Ikatan Bay, King Cove, and the Shumagin Islands.

Chignik.—Mainland shore from Castle Cape to Cape Kunmik.

Kodiak-Afognak Islands.—Kodiak, Spruce, and Raspberry Islands.

Cook Inlet.—The shores of Cook Inlet.

Prince William Sound.—Resurrection Bay to Point Whitshed.

Copper and Bering Rivers.—Point Whitshed to Bering River.

SOUTHEASTERN ALASKA

Yakutat and Dry Bay.—Yakutat Bay to and including Dry Bay.

Icy Strait-Lynn Canal.—West coast of Baranof and Chichagof Islands, the shores of Cross Sound, Icy Strait, Lynn Canal, and Stephens Passage, south to Taku Harbor.

Chatham Strait-Frederick Sound.—Both shores of Chatham Strait and its bays from Point Augusta to Cape Ommaney, and through Frederick Sound and its bays northward to Taku Harbor, including Kake.

Sumner Strait-Dixon Entrance.—Southward from Petersburg and eastward from Port Beauclerc to Cape Chacon and Dixon Entrance, and including all shores along the mainland and intervening islands from the Stikine River to Portland Canal.

West coast, Prince of Wales Island.—Territory west and south of a line from Cape Chacon to Point Baker and Cape Ommaney.

Pack of canned salmon in Alaska in 1937, by districts [1]

District	Coho	Chum	Pink	King	Red	Total	Percentage increase (+) or decrease (−) from 1936
	Cases	*Cases*	*Cases*	*Cases*	*Cases*	*Cases*	
Bristol Bay	138	29,286	----------	6,897	1,421,369	1,457,690	+0.51
Port Moller and Herendeen Bay	----------	6,170	1	234	55,315	61,720	+50.73
Ikatan-Shumagin Islands	6,836	117,147	451,139	2,262	92,639	670,023	−34.27
Chignik	1,626	10,193	57,620	154	52,727	122,320	−19.23
Kodiak-Afognak Islands	14,179	29,353	769,055	357	120,674	933,618	+42.66
Cook Inlet	14,005	12,976	21,528	24,674	109,471	182,654	−41.88
Prince William Sound	6,651	21,941	182,762	329	8,492	220,175	−66.25
Copper and Bering Rivers	5,357	----------	106	3,868	78,238	87,569	+12.52
Yakutat and Dry Bay	11,242	385	7,826	1,794	17,470	38,717	−17.79
Icy Strait-Lynn Canal	11,282	89,771	297,933	5,493	59,433	463,912	−26.16
Chatham Strait-Frederick Sound	11,231	137,866	557,645	3,245	9,800	719,787	+9.37
Sumner Strait-Dixon Entrance	36,798	197,133	875,842	2,947	55,124	1,167,844	−37.09
West coast, Prince of Wales Island	17,972	78,611	403,922	17,214	25,917	543,636	−38.69
Total	137,317	730,832	3,625,379	69,468	2,106,669	6,669,665	−20.95

[1] Pack reduced to the basis of 48 1-pound cans per case.

Canneries operated in Alaska in 1937, by districts

District	Canneries located in district	Canneries handling salmon taken in district
	Number	*Number*
Bristol Bay	21	21
Port Moller and Herendeen Bay	[1] 3	3
Ikatan-Shumagin Islands	[1] 7	7
Chignik	2	2
Kodiak-Afognak Islands	14	14
Cook Inlet	10	10
Prince William Sound	11	11
Copper and Bering Rivers	1	7
Yakutat and Dry Bay	2	2
Icy Strait-Lynn Canal	8	13
Chatham Strait-Frederick Sound	6	20
Sumner Strait-Dixon Entrance	23	25
West coast, Prince of Wales Island	7	21
Total (without duplication)	113	----------

[1] Number includes 2 floating plants that were operated in more than 1 district during the season.

MILD CURING

The production of mild-cured salmon in Alaska in 1937 increased substantially over that for the previous year and was the largest since 1927. Except for a limited amount prepared by two operators on the Yukon River, the entire output was put up in southeast Alaska.

The registration of trolling boats in southeast Alaska by the Bureau was again incomplete; when this work was undertaken in May, many

of the boats were not fishing, owing to the low price of fish, and it was difficult to obtain the required information. The figures published herewith, therefore, are partly estimated.

Seventeen plants were operated and 1,605 persons were employed, as compared with 21 plants and 1,513 persons in 1936. Mild-curing operations were carried on also by a considerable number of plants engaged primarily in other branches of the fisheries.

The total output of mild-cured salmon was 5,721,600 pounds, valued at $1,064,344, an increase of 1,238,400 pounds in quantity and $265,780 in value over the output of the previous year.

Persons engaged, wages paid, and operating units, Alaska salmon mild-curing industry, 1937

Item	Southeast Alaska	Western Alaska	Total
PERSONS ENGAGED			
Fishermen:			
Whites	1,078		1,078
Natives	233	14	247
Chinese	2		2
Filipinos	4		4
Total	1,317	14	1,331
Shoresmen:			
Whites	216		216
Natives	17	22	39
Total	233	22	255
Transporters:			
Whites	15		15
Natives		4	4
Total	15	4	19
Grand total	1,565	40	1,605
Wages paid shoresmen	$92,619	$2,158	$94,777
Wages paid transporters	$10,643	$350	$10,993
OPERATING UNITS			
Plants:			
Shore	13	2	15
Floating—			
Barges	2		2
Net tonnage	270		270
Total plants operated	15	2	17
Vessels:			
Power, over 5 tons	254	4	258
Net tonnage	2,148	36	2,184
Launches	651		651
Gill-net boats		7	7
Rowboats and skiffs	150		150
Lighters and scows	2	1	3
Apparatus:			
Gill nets		14	14
Fathoms		350	350
Lines	3,718		3,718
Wheels		6	6

Products of Alaska salmon mild-curing industry in 1937

Products	Southeast Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Coho, or silver	26,400	$3,700			[1] 26,400	$3,700
Chum, or keta	331,200	22,320			[2] 331,200	22,320
King, or spring	[3] 5,263,200	1,025,724	[4] 100,800	$12,600	[5] 5,364,000	1,038,324
Total	5,620,800	1,051,744	100,800	12,600	5,721,600	1,064,344

[1] 33 tierces. [2] 414 tierces. [3] 6,579 tierces. [4] 126 tierces. [5] 6,705 tierces.

PICKLING

Although somewhat short of that of the 2 previous years, the production of pickled salmon in Alaska in 1937 compared favorably with the general average. About 60 percent of the output was prepared in the western district, chiefly in Bristol Bay; 38 percent was from central Alaska, where the Shumagin Islands region and Cook Inlet were the chief producing centers; and the remaining 2 percent was from southeast Alaska. A considerable number of small outfits engaged in this industry for part of the season, and some pickled salmon was produced in connection with salmon canning or other fisheries.

One hundred and twenty-one persons were employed—an increase of 15 over the number reported for 1936. The total output was 765,396 pounds, valued at $100,550, as compared with 872,915 pounds, valued at $96,510, in the previous year.

Persons engaged, wages paid, and operating units, Alaska salmon-pickling industry, 1937

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
PERSONS ENGAGED				
Fishermen:				
Whites	5	41	12	58
Natives		15	15	30
Total	5	56	27	88
Shoresmen:				
Whites		3	12	15
Natives		1	16	17
Mexicans			1	1
Total		4	29	33
Grand total	5	60	56	121
Wages paid shoresmen		$1,505	$3,182	$4,687
OPERATING UNITS				
Plants:				
Shore	1	30	6	37
Floating—scows	2	1		3
Total plants operated	3	31	6	40
Vessels:				
Power, over 5 tons		2		2
Net tonnage		17		17
Launches		6		6
Power dories		14	1	15
Gill-net boats	2	5	2	9
Seine skiffs		11		11
Rowboats and skiffs	4	20		24
Lighters and scows		2		2
Apparatus:				
Purse seines		3		3
Fathoms		275		275
Beach seines		20		20
Fathoms		1,320		1,320
Gill nets	9	40	23	72
Fathoms	340	1,545	450	2,335

Products of Alaska salmon-pickling industry in 1937

Products	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Coho, or silver	13,000	$886	42,596	$4,161	5,625	$602	61,221	$5,649
Chum, or keta			2,000	90	5,500	336	7,500	426
Pink, or humpback			900	98			900	98
King, or spring			18,600	4,468	13,200	2,552	31,800	7,020
Red, or sockeye	5,800	688	226,600	28,986	431,575	57,683	663,975	87,357
Total	18,800	1,574	290,696	37,803	455,900	61,173	765,396	100,550

FRESH SALMON

Twenty-three firms in southeast Alaska reported an output of fresh salmon in 1937. This production was largely incidental to other branches of the fisheries. Four operators whose chief product was fresh salmon gave employment to 10 white shoresmen. The total products amounted to 3,421,129 pounds, valued at $292,316, as compared with 4,690,507 pounds, valued at $369,442, in 1936—a decrease of 27 percent in quantity and 21 percent in value.

Products of the Alaska fresh-salmon industry in 1937

Species	Pounds	Value
Coho, or silver	539,022	$43,047
Chum, or keta	14,439	608
King, or spring	2,867,668	248,661
Total	3,421,129	292,316

FREEZING

As in the previous year, the freezing of salmon in Alaska in 1937 was carried on only in the southeastern district and was largely incidental to mild curing. Ninety-eight white shoresmen, not shown elsewhere, are credited to the industry. The total output was 5,344,666 pounds, valued at $431,614, as compared with 5,574,914 pounds, valued at $374,330, in 1936—a decrease of 4 percent in quantity, but an increase of 15 percent in value. These figures do not include salmon frozen for use as bait in the halibut fishery.

Products of the Alaska frozen-salmon industry in 1937

Species	Pounds	Value
Coho, or silver	2,798,169	$236,760
Chum, or keta	645,773	27,812
Pink, or humpback	26,431	793
King, or spring	1,874,293	166,249
Total	5,344,666	431,614

DRY-SALTED, DRIED, AND OTHER MISCELLANEOUS SALMON PRODUCTS

In southeast Alaska a pack of canned kippered salmon was prepared by one of the salmon canneries at Ketchikan, the total production amounting to 254 cases of kings and 60 cases of chums, 48 half-pound cans to the case, valued at $1,524 and $270, repectively. In this district, also, there were produced 59,750 pounds of frozen salmon, valued at $634, for use as bait in the halibut fishery. In central Alaska one outfit on Cook Inlet prepared 11,200 pounds of dry-salted king salmon valued at $1,800 and 525 pounds of dry-salted red salmon valued at $100.

In the fishery of the Yukon, Tanana, and Kuskokwim Rivers, which is carried on principally by natives, 1,148,000 pounds of dried chum salmon were prepared, valued at $79,900. Ten whites and 616 natives engaged in the fishery, and the apparatus used consisted of 249 wheels, 388 gill nets of 5,861 fathoms, 2 dories, and 50 rowboats and skiffs.

Production of dry-salted, dried, and other miscellaneous salmon products in Alaska in 1937

Products	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Dry-salted:								
King, or spring			11,200	$1,800			11,200	$1,800
Red, or sockeye			525	100			525	100
Total			11,725	1,900			11,725	1,900
Dried: Chum, or keta					1,148,000	$79,900	1,148,000	79,900
Kippered and canned:								
Chum, or keta	1,440	$270					1,440	270
King, or spring	6,096	1,524					6,096	1,524
Total	7,536	1,794					7,536	1,794
Frozen for bait:								
Coho, or silver	3,608	72					3,608	72
Chum, or keta	56,142	562					56,142	562
Total	59,750	634					59,750	634
Grand total	67,286	2,428	11,725	1,900	1,148,000	79,900	1,227,011	84,228

BYPRODUCTS

Salmon meal and oil were prepared at a byproducts plant in southeast Alaska, which gave employment to 24 white shoresmen, and at a salmon cannery on Larsen Bay, in the central district, in connection with the canning operations.

The total production in 1937 was 1,972,000 pounds of fertilizer, valued at $29,151, and 78,100 gallons of oil, valued at $23,956, as compared with 1,554,000 pounds of fertilizer, valued at $24,579, and 45,435 gallons of oil, valued at $13,984, in 1936—an increase of about 27 percent in the output of fertilizer and 72 percent in the output of oil.

HERRING

Outstanding features of the herring industry of Alaska in 1937 were a sharp curtailment in the production of Scotch-cured herring and a marked expansion in the manufacture of meal and oil, resulting in an all-time record in the total volume of herring products in the Territory.

Only negligible quantities of Scotch-cured herring were prepared in southeast and western Alaska, and the output of this product in the central district was far below normal. Unfavorable market conditions, rather than a scarcity of herring suitable for curing, were primarily responsible for the decline. Most of the plants in southeast Alaska and on Prince William Sound undertook no saltery operations whatever, their entire attention being devoted to the reduction business.

Apparently the only district affected by a shortage of herring was western Alaska, where there was a failure of the runs virtually throughout the season in waters of Dutch Harbor and Akutan Bay in which gill-net fishing is conducted. As in the previous year, there was no production of herring in Golovin Bay. The plant of the Golovin Bay Packing Co. was destroyed by fire in October, with a loss of $21,250.

A good early showing of herring appeared in the Prince William Sound area, forcing some of the plants to put their boats on limit for a time. In the Kodiak area the runs began later and the fish were of excellent quality. About 9,900 barrels of herring from this district were transferred to plants on Prince William Sound.

Of the total output of Scotch-cured herring, less than 75,000 pounds came from southeast Alaska, and approximately 30,000 pounds from the Aleutian Islands area. The Kodiak area produced 1,467,290 pounds and the Prince William Sound area 528,125 pounds, or 70 percent and 25 percent, respectively, of the entire output.

There were 14,167,860 pounds of meal and 2,173,460 gallons of oil produced in the Prince William Sound area, or about 38 percent and 39 percent, respectively, of the total production of meal and oil in Alaska. In the Kodiak area 7,565,066 pounds of meal and 1,421,841 gallons of oil were prepared, or 20 percent and 26 percent, respectively, of the entire output. The proportionately larger yield of oil than of meal in the latter district may be accounted for by the fact that herring there were unusually fat. Forty-two percent of the total output of meal and 35 percent of the oil came from southeast Alaska.

Twenty-two concerns handled herring in southeast Alaska, including six cold-storage plants that froze herring for bait and seven outfits engaged solely in the production of bait herring. Three plants in southeast Alaska that had been closed in 1936 were reopened, among them the plant formerly leased by Richmond Fisheries, Inc., at Red Bluff Bay, which was taken over by a new organization, Red Bluff Bay Fisheries, Inc. This plant was destroyed by fire on August 13, 1937. The following companies operated in the district:

Saltery and reduction plant:	
Storfold & Grondahl Packing Co	Washington Bay.
Reduction plants:	
Arentsen & Co	Big Port Walter.
Atlas Packing Corporation	Deep Cove.
Buchan & Heinen Packing Co	Port Armstrong.
Chatham Strait Fish Co	New Port Walter.
Northwestern Herring Co	Port Conclusion.
Port Herbert Packing Co	Port Herbert.
Red Bluff Bay Fisheries, Inc	Red Bluff Bay.

In central Alaska 10 plants manufactured herring meal and oil, the same number as in the previous year. Five of these plants prepared also the bulk of the Territory's output of Scotch-cured herring. In addition, a small quantity of Scotch-cured herring was produced in connection with salmon pickling in the Kodiak district. The plant of Johnson Fisheries Co. on Thumb Bay was purchased by the Oceanic Fisheries Co. and operated as the Port Oceanic plant by the new owner. The principal operators in the central district were as follows:

Saltery and reduction plants:	
Apex Fish Co	Port Wakefield.
Chatham Strait Fish Co	Crab Bay.
Oceanic Fisheries Co., Inc	Port Oceanic and Port Vita.
San Juan Fishing & Packing Co	Port San Juan.
Reduction plants:	
Evans Bay Packing Co., Inc	Port Benny.
George Hogg & Co	Blue Fox Bay.
Perfection Fisheries, Inc	Thumb Bay.
Shepard Point Packing Co	Port Ashton.
Southwestern Herring, Inc	Iron Creek.

The only output reported from western Alaska was a limited amount of Scotch-cured herring and a small quantity of bloater stock by the following operators:

Campbell & Dougal	Dutch Harbor.
Hoveland & Nesshaug	Do.

Studies concerning the life history and fluctuations in the abundance of the herring populations in Alaska were continued by Edwin H. Dahlgren and an assistant. These studies were carried on in the Chatham Strait fishing area of southeast Alaska and in the Prince William Sound and Kodiak areas of central Alaska.

STATISTICAL SUMMARY

There were 988 persons engaged in the herring industry in 1937, as compared with 1,111 in 1936. The number of plants decreased from 27 to 20. Products of the fishery were valued at $2,891,854, an increase of $816,222, or about 39 percent over 1936, when the total value was $2,075,632. Scotch-cured herring decreased from 11,413,225 pounds, valued at $538,211, to 2,098,040 pounds, valued at $107,968, or about 82 percent in quantity and 80 percent in value. Herring for bait decreased from 6,298,105 pounds, valued at $57,200, to 5,238,172 pounds, valued at $48,816, or about 17 percent in quantity and 15 percent in value. Meal increased about 33 percent in quantity and about 21 percent in value, and oil increased 49 percent in quantity and 122 percent in value.

Persons engaged, wages paid, and operating units, Alaska herring industry, 1937

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
PERSONS ENGAGED				
Fishermen: Whites	337	204	4	545
Shoresmen:				
Whites	170	240	2	412
Natives		10		10
Chinese		1		1
Total	170	251	2	423
Transporters: Whites		20		20
Grand total	507	475	6	988
Wages paid shoresmen	$116,376	$166,730	$200	$283,306
Wages paid transporters		$14,222		$14,222
OPERATING UNITS				
Plants: Shore	8	10	2	20
Vessels:				
Power, over 5 tons	47	28		75
Net tonnage	1,771	2,653		4,424
Launches	3	1		4
Power dories			2	2
Seine skiffs	8	6		14
Other rowboats and skiffs	13	14	2	29
Pile driver		1		1
Apparatus:				
Purse seines	49	27		76
Fathoms	8,065	4,470		12,535
Gill nets			6	6
Fathoms			300	300
Pound seines	9			9
Pounds	4			4

Products of Alaska herring industry in 1937

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Fresh, for bait	2,674,260	$31,180	57,125	$656			2,731,385	$31,836
Frozen, for bait	2,506,787	16,980					2,506,787	16,980
Pickled, for food: Scotch cure	72,750	4,161	1,995,415	101,656	29,875	$2,151	2,098,040	107,968
Roused for food (bloater stock)					10,400	385	10,400	385
Spiced	350	75					350	75
Meal	15,899,608	277,997	21,732,926	351,272			37,632,534	629,269
Oil	[1] 14,804,182	789,017	[2] 26,964,758	1,316,324			[3] 41,768,940	2,105,341
Total	35,957,937	1,119,410	50,750,224	1,769,908	40,275	2,536	86,748,436	2,891,854

[1] 1,973,891 gallons.
[2] 3,595,301 gallons.
[3] 5,569,192 gallons.

HALIBUT

The halibut fleet again operated under a voluntary production-control program, the purpose of which is to equalize deliveries insofar as possible during the season, thus tending to promote more favorable market conditions. Except for a few minor changes, the control program in effect in 1937 was the same as that for the previous year. Some of the vessels began fishing on March 16, some a week later, and the remainder on March 26. Catch limits per man per trip were established, depending upon the area in which fishing was conducted and on the port of landing; and vessels were required to stay in port

10 days between trips, which period was lengthened if trip quotas were exceeded, and shortened if the trip limit was not reached.

Operations were governed also by regulations of the International Fisheries Commission. These regulations were modified somewhat under the provisions of the new halibut treaty between the United States and Canada which became effective on July 28, 1937. For the first time fishermen were permitted to retain halibut taken incidentally in fishing for other species in a closed halibut area. The retention of such halibut, however, was restricted to vessels using set lines and operating under specific permit, and the proportion of halibut in the catch taken and sold was limited to 1 pound of halibut to 7 pounds of other species, exclusive of salmon. Another modification of the regulations involved prescribing the final date on which vessels could leave port for the fishing banks, instead of specifying the closing date of the season. Catch quotas, which were the same in 1937 as in the previous year, were reached earlier than ever before, and the fishing season closed on July 28 in area 2 and on October 19 in area 3. The final date of departure from port for fishing in the latter area was September 29. Closing dates in areas 1 and 4 were the same as in areas 2 and 3, respectively.

The sale of fish livers for pharmaceutical purposes has become well established as an important source of revenue in the halibut industry. Halibut livers brought a price of 50 cents a pound in 1937, or more than four times the price paid in 1932 when this product was beginning to find a profitable market.

Biological studies of the halibut and the collection and analysis of statistical data of the fishery were continued by the International Fisheries Commission under the direction of Dr. W. F. Thompson.

STATISTICAL SUMMARY

Six hundred and ninety-seven persons were employed in the Alaska halibut fishery in 1937—an increase of 103 over the number reported for the preceding year; and products, exclusive of livers, amounted to 13,281,681 pounds, valued at $931,629. This production represents the total fares of the Alaska halibut fleet, which comprises all American vessels landing more than one-half of their catch in Alaska or British Columbia ports rather than in the States. Landings of halibut, exclusive of livers, in Alaska totaled 8,705,204 pounds valued at $557,911, which include 3,000 pounds, valued at $190, landed by Canadian vessels. In 1936 the landings of the Alaska fleet were 13,566,340 pounds, valued at $889,454, and landings in Alaska amounted to 8,658,774 pounds, valued at $507,484. Fares of the Alaska fleet in 1937, therefore, decreased 2 percent in quantity but increased about 5 percent in value over 1936. The landings in Alaska ports in 1937 increased about 1 percent in quantity and 10 percent in value over the preceding year.

The amount of halibut livers landed by the Alaska fleet was not reported, but it was stated that there were altogether about 953,000 pounds of halibut, sablefish, "lingcod," and rockfish livers, valued at about $449,000, landed at Alaska and Pacific coast ports during 1937 by American vessels, as compared with 997,000 pounds, valued at $448,000, landed by American vessels in 1936. The estimated amount of halibut livers landed in Alaska was 146,000 pounds, valued at $73,000.

These statistics were compiled from data collected by the International Fisheries Commission and by agents of the Bureau.

Persons engaged, wages paid, and operating units, Alaska halibut industry, 1937

Item	Total	Item	Total
PERSONS ENGAGED		OPERATING UNITS	
Fishermen: Whites	557	Vessels:	
		Power, over 5 tons	113
		Net tonnage	1,369
Shoresmen:		Launches	33
Whites	135	Skates of lines [1]	3,538
Natives	5		
Total	140		
Grand total	697		
Wages paid shoresmen	$80,012		

[1] The number shown includes skates of lines on vessels and boats other than those credited to the halibut industry which landed one or more fares of halibut.

Products of the Alaska halibut fishery in 1937

Products	Southeast Alaska		Central Alaska		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Fresh (including local)	6,136,109	$419,959			6,136,109	$419,959
Frozen	6,996,102	499,750	148,117	$11,850	7,144,219	511,600
Halibut cheeks, frozen	1,353	70			1,353	70
Livers [1]	143,500	71,750	2,500	1,250	146,000	73,000
Total	13,277,064	991,529	150,617	13,100	13,427,681	1,004,629

[1] The amount of livers landed by the Alaska fleet was not segregated; the quantity shown herein is the estimated amount landed in Alaska by the American fleet.

COD

Cod fishing from shore stations in Alaska is carried on only in a small way, chiefly by independent fishermen in the Shumagin Islands region and in the vicinity of Unalaska. Twenty-six whites and one native were engaged in the industry in 1937, and products amounted to 140,774 pounds of dry-salted cod, valued at $5,189; 40,510 pounds of pickled cod, valued at $2,136; and 22,043 pounds of stockfish, valued at $3,013—a total of 203,327 pounds, valued at $10,338, as compared with 249,331 pounds, valued at $11,881, in 1936.

There were four sailing vessels in the Bering Sea fleet, the products of which are not included in the Alaska fisheries output because the vessels operate from, and land their fares in, ports of the Pacific Coast States. The vessels operated were the *Sophie Christenson* (570 tons), of the Pacific Coast Codfish Co.; the *Wawona* (413 tons), of the Robinson Fisheries Co.; and the *Louise* (328 tons) and *William H. Smith* (496 tons), of the Union Fish Co. The only one of the fleet engaged in the industry in the previous year that was not sent north in 1937 was the *Azalea*, of the Robinson Fisheries Co.

Products of the offshore fishery were 3,776,983 pounds of dry-salted cod, valued at $186,996, and 18,940 pounds of tongues, valued at $1,615—a total of 3,795,923 pounds, valued at $188,611, as compared with 3,891,307 pounds, valued at $194,897, in 1936. The off-

shore fishery employed 165 persons, or 29 less than in the previous year. One fisherman lost his life by drowning.

WHALES

The two plants of the American Pacific Whaling Co. in Alaska—one at Port Hobron and one at Akutan—were again operated, each having three steamers engaged in the taking of whales. After the close of operations at the former station, two of its whaling vessels finished the season at Akutan. Employment was given to 222 persons, of whom 203 were whites and 19 natives.

This was the first year of operation under the international treaty for the regulation of whaling, the act of May 1, 1936, giving effect thereto, and the joint regulations of the Secretary of the Treasury and the Secretary of Commerce issued on October 9, 1936. The required whaling licenses were obtained for the processing plants at a fee of $1,000 each, and $250 was paid for every vessel in excess of two engaged in the taking of whales in connection with each plant. An officer of the Coast Guard was detailed to each plant to enforce the provisions of the Whaling Act and regulations. Biological information with regard to each whale taken and other statistical data were submitted for communication to the International Bureau for Whaling Statistics at Oslo, in accordance with articles 10 and 11 of the convention.

There were 376 whales taken in 1937, consisting of 1 sei whale, and 170 finback, 104 humpback, 45 sulphur bottom, and 56 sperm whales.

Revised figures for 1936 show a total catch of 372 whales, instead of 385, the original report of the Port Hobron station having included by mistake 13 embryo whales, of which 2 were finback and 11 humpback. The total catch in 1937, therefore, represents an increase of 4 whales over the number taken in the previous year.

Products in 1937 amounted to 715,150 gallons of body oil, valued at $400,484; 168,250 gallons of sperm oil, valued at $45,832; 770 tons of fertilizer from meat, valued at $25,410; and 435 tons of bone fertilizer, valued at $7,395—a total value of $479,121, as compared with $334,461 in 1936.

CLAMS

In the Prince William Sound-Copper River region four plants engaged in the production of canned clams in 1937, or three less than in the previous year. Operations were again facilitated by exceptionally favorable weather, both in the spring and fall seasons. The bulk of the pack was put up during the period from April 13 to May 10. Although the regulations for 1937 had been modified to permit a catch of 1,040,000 pounds of clams, round weight, in the first half of the year, as compared with 920,000 pounds formerly, the catch limit was reached by May 10, and operations were discontinued until the fall season opened on August 16. No change had been made in the fall quota of 280,000 pounds, and that limit was reached after 10 days' digging.

A further study of the age composition of the commercial catch of razor clams was made by Paul E. Thompson, special warden engaged in the clam patrol in the above district. More than 98 percent of the clams taken in 1937 were mature, and about 63 percent had spawned more than once. The average catch per man per tide, based upon

operations of 5 experienced diggers, was 348 pounds, as compared with 306 pounds in 1936 and 226 pounds in 1935. These figures indicate the satisfactory condition of the clam beds, as well as the generally favorable weather that prevailed during the period in which most of the clams were taken in the last 2 years.

Very little canning of clams was done outside the Prince William Sound-Copper River region in 1937. Small packs of butter clams were prepared at two plants in southeast Alaska and by an operator on Cook Inlet, and a few cases of clams also were produced in the Kodiak area. The Cook Inlet output was used locally.

Practically all clam-canning operations were in conjunction with other branches of the fisheries. The following operators handled clams during the season: Alaskan Glacier Sea Food Co., Hoonah; Salt Sea Fisheries, Tenakee; W. R. Gilbert Co. Inc., Point Whitshed; Pioneer Canneries, Inc., Cordova; Sandvik Hand Cannery, Uganik Village; Scotty's Packing Co., Mummy Island; S. E. Smith Packing Co., Hartney Point; and O. G. Tiede, Anchorage.

There were 384 persons employed, of whom 326 were whites, 45 natives, and 13 Filipinos. The total production amounted to 31,800 cases, containing 816,942 pounds (804,078 pounds of razor clams, and 12,864 pounds of butter clams), valued at $240,392. This is an increase of about 5 percent in quantity and 19 percent in value, as compared with the output for 1936, when clam products amounted to 780,264 pounds, valued at $201,887.

Products of Alaska clam industry in 1937

Item	Cases	Pounds	Value
RAZOR CLAMS			
Minced:			
½-pound cans (48 to case)	23,201	556,824	$161,181
10-ounce cans (48 to case)	7,975	239,250	73,985
1-pound cans (48 to case)	63	3,024	630
Whole:			
10-ounce cans (48 to case)	142	4,260	1,469
1-pound cans (48 to case)	15	720	150
BUTTER CLAMS			
Minced:			
½-pound cans (48 to case)	22	528	132
Whole:			
½-pound cans (48 to case)	250	6,000	2,000
1-pound cans (48 to case)	132	6,336	845
Total	31,800	816,942	240,392

SHRIMP

In addition to the three plants that have been engaged in the industry for a number of years in southeast Alaska, Kayler-Otness (Inc.) entered the shrimp business in 1937 with the establishment of a shrimp-packing department in its crab cannery, located in part of the wharf building of the Trading Union Co. at Petersburg. Operations of the latter plant were terminated for the season when the building caught fire on November 22 and was destroyed. At Cordova the Alaskan Glacier Sea Food Co. handled a small quantity of shrimp in connection with its crab-packing operations. A part of the output of shrimp there was canned.

There were 194 persons engaged in the industry, of whom 27 were whites, 105 natives, 2 Chinese, 28 Japanese, 29 Filipinos, and 3 Mexicans. Products consisted of 453,744 pounds of cold-packed shrimp meat, valued at $161,679; 6,567 pounds of frozen shrimp meat, valued at $2,627; 26 pounds of fresh shrimp meat, valued at $10; 2,160 pounds of fresh shrimp in the shell, valued at $321; and 37 cases, or 888 pounds, of canned shrimp meat, valued at $296—a total of 463,385 pounds, valued at $164,933. Comparable figures for 1936 show a production of 478,749 pounds, valued at $162,274.

SHRIMP-PICKING MACHINE

The Alaskan Glacier Sea Food Co., of Petersburg, started operations in midsummer with a shrimp-picking machine, invented and perfected after 10 years experimenting by V. Bottker in cooperation with Earl N. Ohmer, owner of the sea-food company. About 200 shrimp a minute are handled by the machine, and more of the meat is removed than by the hand process. The machine also handles smaller shrimp than can be picked by hand. The operation is described in the November 1937 Pacific Fisherman, as follows:

> Shrimp are fed to the machine automatically through a hopper. As they pass along a belt leading from the hopper they strike a brush that points them tail first between two horizontal disks, which line them on the center of the feed belt. The feed belt carries them between two short parallel rubber belts operating on horizontal disks, which sets the shrimp back up on edge and inserts the bottom of their tails between two lower parallel rubber belts. These belts grip the shrimp and carry them between two small revolving horizontal disks fitted with teeth which engage the bottom of the shrimp shell and extend it slightly to each side. The shrimp then strike a perpendicular revolving toothed disk that tears the shell from the meat. The belt carries the meat through jets of water under high pressure and under a revolving brush, then to a receiver. The disk that removes the shell carries the shell around to a bar and a jet of water, which removes the shell and drops it into a waste receiver. Each machine is individually powered with an electric motor.

It is expected that the use of this machine will greatly reduce production costs. A vacuum packing process has been developed to handle the increased output. The expansion of the industry, of course, will depend primarily upon the supply of shrimp available on the trawling grounds.

CRABS

Eight plants in southeast Alaska and five in the central district were engaged in the crab fishery in 1937, the operations in some instances being incidental to other fisheries. The Boardway Canning Co. at Wrangell was sold on February 1, 1937, to the A R B Packing Co. and was operated thereafter by the latter in connection with its salmon cannery. The Alaskan Glacier Sea Food Co. operated crab canneries at Hoonah and Cordova and also handled crabs at its shrimp establishments at Petersburg and Wrangell. The Gulf Packing Co. at Cordova and the Kayler-Otness, Inc., at Petersburg packed both salmon and crabs. A small crab cannery was established by the King Crab Co. in a leased building at Halibut Cove, on Cook Inlet, to pack both King and Dungeness crabs, but only a few dozen cases were prepared during the season. Other operators in the crab fishery were as follows: Ketchikan Sea Foods Co. Inc. (originally established as the Pacific Alaska Sea Foods Co., and later reorganized),

which took over the plant formerly owned by the White Packing Co., at Ketchikan; Oscar H. Wood, at Hoonah; Salt Sea Fisheries, at Tenakee; Scotty's Packing Co., Mummy Island; and S. E. Smith Packing Co., at Hartney Point.

The plant of Kayler-Otness, Inc., was destroyed by fire on November 22, 1937, with a property loss of $6,000. Fire also destroyed the Salt Sea Fisheries plant in November 1937, resulting in an estimated property loss of $6,500.

The output of canned crabs increased about 84 percent over that of the previous year, the chief expansion being in the Cordova district. Cold-packed crab meat, on the other hand, showed a decline to the smallest production since 1923. Of the total crab products in Alaska in 1937, 69 percent were from the vicinity of Cordova and nearly 31 percent from southeast Alaska.

There were 467 persons engaged in the industry, of whom 315 were whites, 115 natives, and 37 Filipinos. Products consisted of 625,429 pounds of canned crab meat (1,105 cases of 6½-ounce cans, 16,079 cases of ½-pound cans, 726 cases of 13-ounce cans, and 1,569 cases of 1-pound cans, 48 to the case; 865 cases of 1-pound cans, 90 to the case; and 1,217 cases of 20-ounce cans, 24 to the case), valued at $251,248; 62,047 pounds of cold-packed meat, valued at $22,826; 467 pounds of crab meat in bulk, sold locally, valued at $233; and 871 dozen whole crabs in the shell, valued at $1,792. Except for 3,120 pounds of king crab (130 cases of ½-pound cans) valued at $910, the entire production was of Dungeness crab. The total output of crab products in 1937 was 711,318 pounds, valued at $276,099, as compared with 473,245 pounds, valued at $158,874, in 1936, an increase of 50 percent in quantity and 74 percent in value.

Products of the Alaska crab industry in 1937

Product	Southeast Alaska			Central Alaska			Total		
	Number	Pounds	Value	Number	Pounds	Value	Number	Pounds	Value
DUNGENESS CRABS									
Canned:									
6½-ounce cans (48 to case) cases	-------	-------	-------	1,105	21,547	$9,945	1,105	21,547	$9,945
½-pound cans (48 to case) cases	5,534	132,816	$52,000	10,415	249,960	93,832	15,949	382,776	145,832
13-ounce cans (48 to case) cases	-------	-------	-------	726	28,314	13,068	726	28,314	13,068
1-pound cans (48 to case) cases	247	11,856	6,471	1,322	63,456	24,414	1,569	75,312	30,885
1-pound cans (90 to case) cases	-------	-------	-------	865	77,850	38,925	865	77,850	38,925
20-ounce cans (24 to case) cases	-------	-------	-------	1,217	36,510	11,683	1,217	36,510	11,683
Cold-packed meat:									
1-pound cans	12,658	12,658	4,942	-------	-------	-------	12,658	12,658	4,942
20-ounce cans	25,016	31,270	10,805	-------	-------	-------	25,016	31,270	10,805
3-pound cans	-------	-------	-------	528	1,584	792	528	1,584	792
5-pound cans	2,534	12,670	4,763	773	3,865	1,524	3,307	16,535	6,287
Crab meat in bulk pounds	-------	-------	-------	467	467	233	467	467	233
Whole in shell dozen	551	13,775	1,152	320	9,600	640	871	23,375	1,792
KING CRABS									
Canned:									
½-pound cans (48 to case) cases	73	1,752	511	57	1,368	399	130	3,120	910
Total	-------	216,797	80,644	-------	494,521	195,455	-------	711,318	276,099

TROUT

Only a small commercial production of Dolly Varden and steelhead trout in Alaska was reported, all of which was incidental to other branches of the fisheries in the southeastern district. The reported products were as follows: Dolly Vardens, 41,740 pounds fresh, valued at $2,966, and 2,545 pounds frozen, valued at $255; steelheads, 17,714 pounds frozen, valued at $1,627. The total output of both species was 61,999 pounds valued at $4,848, as compared with 46,363 pounds valued at $3,836 in 1936.

MISCELLANEOUS FISHERY PRODUCTS

Fish of minor commercial importance are taken in limited quantities, chiefly in connection with the halibut fishery, and are landed in ports of Alaska and British Columbia and at Seattle. Such products landed in Alaska in 1937 were as follows: Sablefish, 4,063 pounds fresh, valued at $110, 1,839,137 pounds frozen, valued at $56,576, 190,185 pounds pickled, valued at $6,794, and 69,582 pounds of livers, valued at $27,833; rockfish, 16,843 pounds frozen, valued at $336; flounders, 180,000 pounds fresh, valued at $4,500; "lingcod," 743 pounds frozen, valued at $15, and 2,264 pounds of livers, valued at $906; and smelt, 275 pounds frozen, valued at $8.

FUR-SEAL INDUSTRY

PRIBILOF ISLANDS

GENERAL ADMINISTRATIVE WORK

In 1937, 55,180 fur-seal skins were taken at the Pribilof Islands, an increase of 2,734 over the number taken in the preceding year. Of the skins secured on St. Paul Island, 41,383 were removed from the animals by the stripping process and blubbered before curing. The remaining 2,685 skins from that island and the entire take of 11,112 skins from St. George Island were removed by the skinning process.

Delivery was made to a representative of the Canadian Government at Seattle of 8,277 sealskins, representing 15 percent of the season's take, selected proportionately from the different sizes and grades, in accordance with provisions of the treaty of July 7, 1911. The remaining 46,903 skins were forwarded to the Fouke Fur Co. at St. Louis, Mo., for processing and sale at public auction. After the latter skins are sold, payment from the net proceeds will be made to Japan of its share of 15 percent of the season's take, due under the fur-seal treaty.

The byproducts plant at St. Paul Island was again operated for the utilization of fur-seal carcasses. Products for the season amounted to 29,830 gallons of oil and 165 tons of meal. These products, except for small quantities used at the Pribilof Islands for fox feed, were shipped to Seattle, where the oil was sold by competitive bidding and the meal was transferred to the Division of Fish Culture for feeding fish in hatcheries throughout the country.

In the 1937–38 season there were taken on the Pribilof Islands, 863 foxskins, consisting of 231 blue and 15 white skins from St. Paul Island and 616 blue skins and 1 white skin from St. George Island.

Sealing and foxing activities were performed, as usual, by Pribilof natives under the direction of the Bureau's staff. Approximately 80 additional laborers from the Aleutian Islands were employed to assist with sealing operations during the summer.

No important construction program was undertaken at the Pribilof Islands during the year, but work on the extension of roads was continued on both islands and some improvements were made in buildings and equipment. A substation on one of the western Aleutian Islands was established for the expansion of sea-otter investigations and patrol.

The operation of the radio station on St. Paul Island, previously maintained by the Navy Department, was taken over by the Bureau on August 10.

A patrol for the protection of the fur-seal herd during its northward migration and while it remained in Bering Sea waters was maintained by Coast Guard cutters, which also rendered other assistance in the Bureau's work. The Navy Department detailed the U. S. S. *Sirius* to carry the annual shipment of supplies from Seattle to the Pribilof Islands and to bring out the season's take of sealskins.

TRANSPORTATION OF SUPPLIES

The U. S. S. *Sirius*, supply vessel of the Navy, sailed from Seattle on July 28 with the annual shipment of supplies for the Pribilof Islands, which aggregated 888 tons of general freight and 100,901 board feet of lumber for St. Paul Island and 605 tons of freight and 27,546 board feet of lumber for St. George Island, a total of 1,493 tons and 128,447 board feet of lumber. Supplies were carried also for the Navy Department, the Coast and Geodetic Survey, and the Bureau of Indian Affairs at Dutch Harbor. The vessel arrived at the Pribilof Islands on August 6.

On the return trip to Seattle, which covered the period from August 14 to August 27, the vessel brought out 54,679 sealskins, approximately 162 tons of seal meal, and miscellaneous freight. Certain equipment and supplies of the Navy Department that were not transferred to the Bureau when it took over custody of the naval radio station on St. Paul Island were transported to Dutch Harbor by the *Sirius* en route south.

Additional supplies for the Pribilof Islands were shipped during the year on the *Penguin*.

POWER VESSEL "PENGUIN"

Five round trips between Seattle and the Pribilof Islands were made by the *Penguin* in 1937, carrying passengers and supplies. In addition, the vessel performed interisland service and made trips to Indian settlements along the Alaska Peninsula and the Aleutian Islands to transport native laborers hired for fur-seal work at the Pribilofs during the summer. Two trips were made to the western Aleutians—one in July and one in September—in connection with the sea-otter patrol.

A full cargo of freight, chiefly perishable foodstuffs, was carried on each trip from Seattle, and outgoing shipments from the islands included the 1936–37 take of foxskins, transported to Seattle in March,

and the fur-seal oil produced at the byproducts plant on St. Paul Island, which was brought out in September and November.

The north-bound voyages of the *Penguin* were as follows: February 3–24; May 1–13; June 12–22; August 21–September 3; and October 14–26. South-bound voyages covered the following periods: February 27–March 20; May 19–30; August 2–12; September 19–October 1; and November 2–14. On these voyages transportation was furnished to 74 passengers for the Bureau, including 26 employees of the Fouke Fur Co. who assisted with the season's sealing activities at the islands, and 9 persons connected with the Bureau's salmon patrol and investigations in Alaska. The vessel also transported 25 passengers for the Navy, 6 for the Office of Indian Affairs, 3 for the Coast Guard, 1 for the Bureau of Lighthouses, 2 Territorial teachers, and 10 unofficial travelers.

Deputy Commissioner Charles E. Jackson and party transferred from the *Brant* to the *Penguin* at Unalaska on July 14 and were taken to the Pribilof Islands for observation of the fur-seal activities. From there the *Penguin* took them to Naknek, where they boarded the *Scoter* on July 18.

The *Penguin* cruised 30,063 nautical miles during the year.

ST. PAUL ISLAND RADIO STATION

Having augmented its radio facilities at Dutch Harbor, the Navy Department in 1937 discontinued as a part of the Coast Signal Service the operation of its combined radio transmitting and receiving station and radio direction finder station at St. Paul Island.

In view of the activities of the Bureau of Fisheries at the Pribilof Islands and the need for maintaining radio service in that isolated region, a radio transmitter and three receivers, together with such associated equipment as required for their operation, two small radio telephone sets for interisland communication, and all the buildings at the radio station were made available for the use of the Department of Commerce under a revocable permit. Custody of the station was transferred to the latter department on August 10, 1937. In lieu of the radio direction finder, which was discontinued, a radiobeacon was installed by the Bureau of Lighthouses.

Under the conditions of transfer, (*a*) Navy personnel visiting the islands will inspect the Navy-owned equipment to insure it is in satisfactory operating condition and will make such repairs as may be necessary without labor charge; (*b*) spare parts, crystals, etc., for use with Navy-owned radio equipment may be purchased by the Department of Commerce through the navy yard at Puget Sound; (*c*) Navy-owned equipment which may become obsolete or which may not be required for further use will be reported to the Commandant, Navy Yard, Puget Sound, for removal; (*d*) additions, alterations, or replacements to existing buildings or equipment may be made by the Department of Commerce but will revert to the Navy in the event the radio station is retransferred to the Navy in the future; but items of miscellaneous material and equipment, such as furniture, furnishings, tools, etc., may be expended from the inventory without replacement at the discretion of the Secretary of Commerce; and (*e*) annotations of the itemized inventory of the Navy-owned property will be made periodically by a representative of the

Department of Commerce and any major changes will be recorded and reported to the representative of the Commandant, Navy Yard, Puget Sound, during his annual visit to the island.

Daily weather observations are transmitted direct to the Weather Bureau, which has maintained a meteorological station on St. Paul Island for a number of years in cooperation with the Navy Department. Such observations are of much value in connection with the forecast and warning service in Alaska and in the States.

Pending the appointment of a radio electrician who will serve as head operating engineer in charge of the power plant and other electric equipment on St. Paul Island, the work at this station has been carried on by Carl M. Hoverson in addition to his duties as school teacher.

ROADS

St. Paul Island.—The new scoria road toward Marunich on St. Paul Island, which branches westward from the Northeast Point Road near Halfway Point, was extended one-half mile. Considerable work was done in repairing Northeast Point Road, including the sodding of sand dunes along the roadway. Some repairs, also, were made on Zapadni Road. In the spring there was built a retaining wall for the road bank around Big Lake, where high water and continuous south winds had caused considerable damage during the winter.

St. George Island.—The Zapadni Road on St. George Island was extended 5,700 feet, of which 1,500 feet was a plank road and 4,200 feet was surfaced with scoria. Repair work carried on during the year included the leveling and resurfacing with scoria of sections of Staraya Artil Road, the old road by North Rookery, and West Road.

BUILDINGS

St. Paul Island.—Excavations were made for the foundations of a new machine shop, and a new salt-water intake system for washing sealskins on St. Paul Island was completed. Extensive repairs were made on washhouse A, which was damaged by storm on the night of November 8, 1937.

St. George Island.—Additional work was done in 1937 on buildings erected in the previous year on St. George Island—namely, the electric power and cold-storage plant and an extension of the garage, and the installation of cold-storage and power machinery and equipment was completed. No major construction projects were undertaken during the year.

BYPRODUCTS PLANT

At the byproducts plant on St. Paul Island in 1937, 6,490 cubic feet of blubber, or about 337,480 pounds, and 31,260 fur-seal carcasses were rendered into oil and meal. Operations began on June 20 and were discontinued on August 4. The total products amounted to 377 barrels, or 20,234 gallons, of No. 1 oil; 172 barrels, or 9,596 gallons, of No. 2 oil; and 330,265 pounds of meal. The foregoing quantities in gallons represent averages of 53.67 gallons per barrel of No. 1 oil and 55.8 gallons per barrel of No. 2 oil, as determined from the products sold by weight upon the basis of 7½ pounds to the gallon.

The supply vessel *Sirius* brought to Seattle in August 324,265 pounds of meal, which was turned over to the Division of Fish Culture to be used as fish food at Federal hatcheries throughout the country. Later that division found that a part of the shipment was surplus to its needs, and 35,000 pounds of meal was turned over to the Bureau of Animal Industry, of the Department of Agriculture, to be used in the feeding of hogs at the experiment station at Miles City, Mont.

Shipments of fur-seal oil were brought to Seattle on the *Penguin*—372 barrels of No. 1 oil on the September voyage and 169 barrels of No. 2 oil in November. A barrel of the No. 1 oil was delivered to the Bureau of Entomology and Plant Quarantine, of the Department of Agriculture, for testing to determine whether it would be suitable for use in spraying activities in the gypsy and browntail moth work carried on in the New England States, in which work large quantities of menhaden oil have been used for a number of years. There was furnished also to the Oil, Fat, and Wax Section of the Bureau of Chemistry and Soils, Department of Agriculture, a 1-quart sample of oil for experimental purposes.

In November, 19,912 gallons of No. 1 fur-seal oil and 9,429⅓ gallons of No. 2 oil were sold at Seattle by competitive bidding for $5,396.80. The No. 1 oil brought 20 cents a gallon and the No. 2 oil 15 cents a gallon, or decreases of about 37 and 48 percent, respectively, from the prices obtained for similar grades of oil in 1936. The general decline in prices of oils is attributed to an overproduction of cottonseed oil during the season.

NATIVES

CENSUS

On December 31, 1937, the total native population of St. Paul Island was 263, including 10 persons who were temporarily absent from the island. There were 13 births and 3 deaths during the year.

The census of St. George Island on December 31, 1937, showed a population of 163 natives, including 5 persons temporarily absent from the island. There were 5 births and 1 death during the year.

The total native population of both islands at the end of 1937 was 426, or an increase of 14 over the census of the previous year.

MEDICAL SERVICE

Two physicians stationed at the Pribilof Islands throughout the year gave medical aid to the natives and to Government employees and their families. The general health of the natives and the sanitary conditions on both islands were good.

During the year two Pribilof natives were taken to Seattle on the *Penguin* and placed in the hospital of the United States Bureau of Indian Affairs at Tacoma, Wash., for special surgical treatment which could not be performed at the islands with the facilities available there. In one of these cases, a boy of 6 from St. George Island was operated on for cleft palate and harelip. He arrived at Seattle on March 20 and returned to St. George Island on the May trip of the *Penguin*. At least one more operation will be necessary before the deformity is corrected. The other case was that of a boy of 9 from

St. Paul Island, who was brought to Seattle on the *Penguin* in November for treatment of a tubercular ankle.

Another St. Paul Island native, who lost his left leg in an accident several years ago, was fitted with an artificial leg at Seattle. He came out from the island on the *Penguin* in November 1936 and returned in February 1937.

SCHOOLS

The Bureau maintains schools for the native children on St. Paul and St. George Islands, and all children between the ages of 6 and 16 are required to attend. Two teachers are employed on each island. Instruction is confined to the elementary branches, including some manual training and home economics.

The 1936–37 school year began on September 15, 1936, on St. Paul Island and on September 21, 1936, on St. George Island; it closed on May 7, 1937, on both islands.

On St. Paul Island there were 9 girls and 26 boys enrolled in the junior school, and 18 girls and 14 boys in the senior school, a total enrollment of 67. On St. George Island 10 girls and 11 boys were in the junior school and 14 girls and 8 boys in the senior school, a total of 43 pupils.

SAVINGS ACCOUNTS

Ten Pribilof Islands natives have savings accounts in the bank of the Washington Loan & Trust Co., Washington, D. C., on which they receive interest, compounded semiannually. Effective March 1, 1937, the interest rate was reduced from 2½ to 2 percent. The Commissioner of Fisheries is the trustee of their funds. A summary of the trust account for the year 1937 is as follows:

On hand Jan. 1, 1937	$4,746.93
Interest earned from Jan. 1 to Dec. 31, 1937	90.11
Total	4,837.04
Withdrawn by natives	635.00
On hand Dec. 31, 1937	4,202.04

The following is an itemized statement of the funds, setting forth the individual accounts:

Funds of the Pribilof Islands natives in the custody of the United States Commissioner of Fisheries, as trustee, Dec. 31, 1937

Kochutin, Alexandra	$1,661.21	Merculief, Elizabeth	$73.37
Kozloff, Marina	137.10	Merculief, Erena	517.12
Lekanof, Tatiana (Merculief)	536.53	Merculief, George	111.84
Lestenkof, Michael	434.14	Pankoff, Agrippina	210.31
Merculief, Alexandra	94.66	Total	4,202.04
Merculief, Daniel	425.76		

PAYMENTS FOR TAKING FUR-SEAL SKINS

Natives on the Pribilof Islands are paid for their labor in taking sealskins at specified rates per skin, with some additional compensation for special services. As the work is collective in character, workers on each island are divided into classes according to their skill and ability and the total amount for the island is apportioned among them, each man in a given class receiving an equal share.

On St. Paul Island the payments to natives in 1937 were at the rate of 60 cents per skin for the 44,068 sealskins taken, or a total of $26,440.80, and in addition $180 was paid to two foremen and four mess attendants.

Natives on St. George Island were paid at the rate of 75 cents per skin, the total in 1937 amounting to $8,334 for the 11,112 sealskins taken, with an additional payment of $100 to two native foremen.

Details of these payments are shown in the following table:

Payments to Pribilof Islands natives for taking fur-seal skins, calendar year 1937

Classification	St. Paul Island			St. George Island		
	Number of men	Share of each	Total	Number of men	Share of each	Total
First class	32	$486.60	$15,571.20	27	$216.00	$5,832.00
Second class	14	384.00	5,376.00	10	157.50	1,575.00
Third class	12	241.20	2,894.40	3	107.25	321.75
Fourth class	11	201.00	2,211.00	3	81.75	245.25
Fifth class	5	61.80	309.00	5	58.50	292.50
Boys' class	3	26.40	79.20	2	33.75	67.50
Foreman (additional compensation)			60.00			55.00
Do			40.00			45.00
Mess attendants (4)			80.00			
Total	77		26,620.80	50		8,434.00

PAYMENTS FOR TAKING FOXSKINS

For taking foxskins on the Pribilof Islands in the 1936–37 season the natives were paid at the rate of $5 per skin. The total payments amounted to $530 for the 106 foxskins taken on St. Paul Island and $4,530 for the 906 skins taken on St. George Island, a total of $5,060.

FUR SEALS

KILLINGS

In 1937, 55,180 fur seals were killed, of which 44,068 were taken on St. Paul Island and 11,112 on St. George Island. Details in regard to the killings are shown in the following tabulations:

Seal killings on Pribilof Islands in 1937

ST. PAUL ISLAND

Date	Serial number of drive	Hauling ground	Skins secured
June 4	1	Sea Lion Rock (Sivutch)	49
10	2	Reef	148
19	3	Zapadni	223
20	4	Reef and Gorbatch	648
21	5	Polovina and Little Polovina	155
22	6	Vostochni and Morjovi	562
23	7	Zapadni and Little Zapadni	349
24	8	Tolstoi, Lukanin, and Kitovi	105
25	9	Reef and Gorbatch	1,023
26	10	Polovina and Little Polovina	288
27	11	Vostochni and Morjovi	1,148
28	12	Zapadni and Little Zapadni	1,206
29	13	Tolstoi, Lukanin, and Kitovi	422
30	14	Reef and Gorbatch	901

Seal killings on Pribilof Islands in 1937—Continued

ST. PAUL ISLAND—Continued

Date	Serial number of drive	Hauling ground	Skins secured
July 1	15	Vostochni and Morjovi	1,134
2	16	Polovina and Little Polovina	757
3	17	Zapadni and Little Zapadni	887
4	18	Tolstoi, Lukanin, and Kitovi	787
5	19	Reef and Gorbatch	1,566
6	20	Polovina and Little Polovina	423
7	21	Vostochni and Morjovi	1,615
8	22	Zapadni and Little Zapadni	1,960
9	23	Tolstoi, Lukanin, and Kitovi	627
10	24	Reef and Gorbatch	1,212
11	25	Polovina and Little Polovina	782
12	26	Vostochni and Morjovi	3,024
13	27	Zapadni and Little Zapadni	2,140
14	28	Tolstoi, Lukanin, and Kitovi	897
15	29	Reef and Gorbatch	1,657
16	30	Polovina and Little Polovina	441
17	31	Vostochni and Morjovi	1,668
18	32	Zapadni and Little Zapadni	1,620
19	33	Tolstoi, Lukanin, and Kitovi	471
20	34	Reef and Gorbatch	2,314
21	35	Polovina and Little Polovina	589
22	36	Vostochni and Morjovi	2,003
23	37	Zapadni and Little Zapadni	1,842
24	38	Tolstoi, Lukanin, and Kitovi	771
25	39	Reef and Gorbatch	1,624
26	40	Polovina and Little Polovina	668
27	41	Vostochni and Morjovi	1,289
28	42	Zapadni, Little Zapadni, Tolstoi, Lukanin, and Kitovi	835
29	43	Reef and Gorbatch	483
30	44	Vostochni, Morjovi, Polovina, and Little Polovina	755
		Total	44,068

ST. GEORGE ISLAND

June 9	1	Zapadni	26
14	2	North and East	86
16	3	Zapadni	32
20	4	Zapadni	40
21	5	North and Staraya Artil	205
23	6	East	77
24	7	Zapadni	84
25	8	North and Staraya Artil	366
27	9	East	151
28	10	Zapadni	266
29	11	North and Staraya Artil	430
July 1	12	East	145
2	13	Zapadni	365
3	14	North and Staraya Artil	424
5	15	East	203
6	16	Zapadni	260
7	17	North and Staraya Artil	611
9	18	East	305
10	19	Zapadni	243
11	20	North and Staraya Artil	567
13	21	East	187
14	22	Zapadni	236
15	23	North and Staraya Artil	683
17	24	East	376
18	25	Zapadni	249
19	26	North and Staraya Artil	970
21	27	East	312
22	28	Zapadni	150
23	29	North and Staraya Artil	830
25	30	East	303
26	31	Zapadni	104
27	32	North and Staraya Artil	897
28	33	East	217
29	34	Zapadni	74
30	35	North and Staraya Artil	638
		Total	11,112

AGE CLASSES

The age class of a male seal of the Pribilof Islands herd is determined from the length of its body. The classification was derived from measurements of a large number of pups branded in 1912 and killed in subsequent years. The limits of the various age classes are shown in the table following:

Age classes of male seals, Pribilof Islands

Age	Length (inches)	Age	Length (inches)
Yearlings	Up to 36.75	4-year-olds	46 to 51.75
2-year-olds	37 to 40.75	5-year-olds	52 to 57.75
3-year-olds	41 to 45.75	6-year-olds	58 to 63.75

Ages of seals killed on Pribilof Islands, calendar year 1937

[On basis of classification shown in preceding table]

Age	St. Paul Island	St. George Island	Total
Yearling males	4		4
2-year-old males	1,433	429	1,862
3-year-old males	40,944	9,856	50,800
4-year-old males	1,566	772	2,338
5-year-old males	4	2	6
Cows [1]	117	53	170
Total	44,068	11,112	55,180

[1] Cows unavoidably and accidentally killed or found dead.

Some of the seals recorded in the above tabulation as 2-year-olds and 4-year-olds probably were 3-year-olds, as not all male seals of a given age fall within the length limits assigned for the males of that age. As far as possible, the killings in 1937 were confined to 3-year-old males.

COMPUTATION OF FUR-SEAL HERD

The computation of the fur-seal herd in 1937 was made by Supt. H. J. Christoffers. As of August 10 the total of all classes was 1,839,119—a numerical increase of 149,376 over the figures for the preceding year. The detailed report will be found on pages 142 to 150 of this document. Following is a comparative statement of the numerical strength of the various elements of the fur-seal herd in the years 1926 to 1937, inclusive.

General comparison of computations of the seal herd on the Pribilof Islands, 1926 to 1937

Classes	1926	1927	1928	1929	1930	1931
Harem bulls	4,034	4,643	6,050	7,187	8,312	9,233
Breeding cows	244,114	263,566	284,725	307,491	332,084	358,642
Surplus bulls	2,002	4,827	5,285	5,207	3,963	3,291
Idle bulls	423	972	1,449	1,633	1,899	1,888
6-year-old males	13,434	13,450	12,857	10,399	5,612	6,553
5-year-old males	16,812	16,073	13,001	7,016	8,191	10,193
4-year-old males	17,872	14,448	7,798	9,102	11,327	12,966
3-year-old males	17,189	9,730	11,133	13,639	14,871	13,198
2-year-old males	38,183	41,252	49,087	64,354	69,674	74,828
Yearling males	56,514	61,026	65,861	85,381	92,232	99,612
2-year-old cows	44,415	48,186	57,061	67,210	72,605	78,410
Yearling cows	62,175	67,131	72,481	85,417	92,247	99,626
Pups	244,114	263,566	284,725	307,491	332,084	358,642
Total	761,281	808,870	871,513	971,527	1,045,101	1,127,082

Classes	1932	1933	1934	1935	1936	1937
Harem bulls	10,088	10,213	10,770	11,547	12,321	13,100
Breeding cows	387,320	418,299	451,751	487,883	526,848	568,982
Surplus bulls	2,893	4,700	6,494	6,139	7,994	9,140
Idle bulls	2,349	2,341	2,282	2,535	2,733	3,031
6-year-old males	8,154	9,335	8,173	11,117	11,421	15,188
5-year-old males	11,669	10,216	13,897	14,276	18,985	21,586
4-year-old males	11,351	15,441	15,862	21,096	23,991	33,815
3-year-old males	17,849	18,216	24,770	28,165	40,170	45,891
2-year-old males	81,101	87,662	94,920	102,555	110,505	118,889
Yearling males	107,592	116,195	125,490	135,525	146,365	158,051
2-year-old cows	84,682	91,454	98,768	106,666	115,197	124,410
Yearling cows	107,593	116,197	125,490	135,526	146,365	158,054
Pups	387,320	418,299	451,751	487,883	526,848	568,982
Total	1,219,961	1,318,568	1,430,418	1,550,913	1,689,743	1,839,119

FOXES

A herd of blue foxes is maintained on each of the two principal islands of the Pribilof group, where the animals roam at large and obtain their food during most of the year from birds, birds' eggs, and miscellaneous sea life abundant on the beaches. In the winter, when the natural supply of food is scarce, the foxes are fed prepared rations, consisting chiefly of biscuits made of cereals, seal meal, and seal oil. In December and January the animals are trapped for their pelts and a suitable number are reserved for future breeding requirements.

TRAPPING SEASON OF 1937–38

In the 1937–38 season there were taken 863 fox pelts, of which 847 were blue and 16 white. Two hundred and thirty-one blue and 15 white pelts were taken on St. Paul Island and 616 blue pelts and 1 white pelt on St. George Island.

There were trapped, marked, and released for breeding stock 59 male and 56 female foxes on St. Paul Island and 44 males and 41 females on St. George Island. The breeding reserve includes also a considerable number of animals that were not captured during the season.

CORRECTION IN REPORT OF TRAPPING SEASON 1936-37

The report of foxing operations at the Pribilof Islands in the 1936–37 season showed a total take of 999 blue and 13 white foxskins. When these skins were graded by the Department's selling agents at St. Louis, Mo., however, it was found that one of the skins from St. Paul Island which was listed originally as white was a freak skin, more blue than white, and it was included with the blue skins in the sale. The records have been corrected, therefore, to show the 1936–37 season's take as 1,000 blue and 12 white foxskins.

REINDEER

St. Paul Island.—There were 1,673 reindeer counted on St. Paul Island on September 30, 1937, of which 420 were the young of the season. Eighty animals (70 males and 10 females) had been killed for food during the year. Of these, 36 were used at the mess of the Bureau, 2 by the naval radio station, 27½ by St. Paul Island natives, 10 by temporary native workmen, ½ by the *Penguin*, and 4 were shipped to St. George Island. The herd was in good condition.

St. George Island.—A count of the reindeer on St. George Island on October 16 showed 32 animals in the herd, of which 8 were this year's fawns. Five males and three females had been killed for food during the year. In April 1937 there were 45 reindeer counted on this island, including 12 young deer. The fall census, therefore, indicates that four of the young had died or been killed by the older bucks.

Apparently conditions on St. George Island are not favorable for the maintenance of more than a limited number of reindeer. In the first few years after their introduction on the Pribilof Islands, the reindeer increased rapidly, and by the end of 1916 there were 111 on St. Paul Island and 85 on St. George Island from an original stock of 25 and 15, respectively, transferred there in 1911. The herd on St. George Island reached its maximum in 1922 with an estimated total of 200 animals. From 1917 to 1926, inclusive, 194 reindeer were killed for food on St. George Island and 172 on St. Paul Island. Since 1926, however, only 16 animals have been taken for food on St. George Island, as compared with 299 on St. Paul Island. At present the herd on St. George Island is the smallest for any year since 1912, and there appears to be a surplus of males, these animals numbering more than 2 to 1 of the females.

FUR-SEAL SKINS

SHIPMENTS

Six hundred and ninety-seven barrels containing 54,679 fur-seal skins taken on the Pribilof Islands in 1937 were shipped on the U. S. S. *Sirius* and arrived at Seattle on August 27. Fifteen barrels of blubber, having a gross weight of 8,192 pounds, also were brought to Seattle on the *Sirius*, for use by the Fouke Fur Co. in the tanning of sealskins.

Delivery of 8,277 skins packed in 104 barrels was made to a representative of the Canadian Government at Seattle on August 30, in accordance with provisions of the fur-seal treaty. The remaining

46,402 skins were forwarded by freight to the Fouke Fur Co. at St. Louis, Mo., and arrived there on September 8, 1937.

Sevens barrels containing 501 sealskins taken on the Pribilof Islands in 1937 and specially cured for experimental purposes were brought to Seattle on the *Penguin* in August and were turned over to a representative of the Fouke Fur Co. on August 13 for shipment to St. Louis.

SALES

Two public auction sales of fur-seal skins taken on the Pribilof Islands were held at St. Louis in 1937—on April 19 and September 27, respectively—at which a total of 42,005 skins were sold for a gross sum of $1,083,590. During the year, also, 963 sealskins taken on the Pribilof Islands were disposed of at private sales, under special authorization of the Secretary of Commerce, for a total of $27,449.61. In the following detailed statements the sales of other sealskins by the Department of Commerce for the account of the Government are included, in order that the records may be complete.

April 19, 1937.—On April 19, 1937, 22,278 Pribilof Islands fur-seal skins, dressed, dyed, and machined, were sold for $662,950. These skins consisted of 8,090 dyed black and 14,188 dyed safari brown.

September 27, 1937.—At the sale on September 27, 19,727 Pribilof Islands fur-seal skins were sold for $420,640. Of these, 19,580 dressed, dyed, and machined, brought $420,566.50, and 147 miscellaneous partly processed skins brought $73.50. In addition, 214 fur-seal skins taken by the Japanese Government on Robben Island in 1936 and allotted to the United States as its share of such skins under provisions of the fur-seal treaty, were sold for $3,772.50. Of these, 199 dressed, dyed, and machined skins, dyed safari brown, brought $3,720, and the remaining 15 skins, unhaired and dressed, brought $52.50.

Special sales.—During the year 963 Pribilof Islands fur-seal skins were sold under special authorization by the Department for advertising and promotional purposes, the gross sales amounting to $27,449.61. Of these skins, 553 dyed safari brown brought $15,438.75; 394 dyed black, $11,844.14; and 16 raw skins, $166.72.

Further details in regard to the sales of sealskins by the Department of Commerce for the account of the Government in 1937 are given in the following tables:

Comparative values, by sizes and grades, with percentages each size, of Pribilof sealskins sold at public auction in 1937

Classes and sales	Grade	Number	High	Low	Average	Total	Total number	Average price	Total amount	Percentage
DYED BLACK										
Extra extra large:										
Apr. 19	I and II	3	$45.50	$45.50	$45.50	$136.50	6	$39.50	$237.00	0.07
	Scarred, faulty, etc.	3	33.50	33.50	33.50	100.50				
Extra large:										
Apr. 19	I and II	84	45.50	42.50	43.36	3,642.00	180	36.29	6,533.00	2.22
	Scarred, faulty, etc.	86	33.50	31.50	32.10	2,761.00				
	III	10	13.00	13.00	13.00	130.00				
Sept. 27	I and II	60	38.00	38.00	38.00	2,280.00	160	31.31	5,010.00	2.28
	Scarred, faulty, etc.	100	27.50	27.00	27.30	2,730.00				
Large:										
Apr. 19	I and II	1,183	42.00	38.00	39.91	47,211.50	2,218	35.01	77,653.50	27.42
	Scarred, faulty, etc.	1,002	31.00	28.50	29.95	30,013.00				
	III	33	13.00	13.00	13.00	429.00				
Sept. 27	I and II	990	33.00	29.50	31.42	31,110.00	2,174	27.08	58,872.50	31.06
	Scarred, faulty, etc.	1,155	26.00	22.50	23.85	27,545.00				
	III	29	7.50	7.50	7.50	217.50				
Medium:										
Apr. 19	I and II	2,595	36.00	30.50	33.12	85,942.50	5,006	28.76	143,993.50	61.88
	Scarred, faulty, etc.	2,199	27.50	23.50	25.59	56,273.50				
	III	212	13.00	7.50	8.38	1,777.50				
Sept. 27	I and II	1,860	25.50	23.00	24.45	45,485.00	4,195	20.59	86,356.50	59.93
	Scarred, faulty, etc.	2,240	19.50	17.00	17.96	40,240.00				
	III	95	7.50	6.00	6.65	631.50				
Small medium:										
Apr. 19	I and II	181	26.00	25.00	25.38	4,593.00	680	17.48	11,883.00	8.41
	Scarred, faulty, etc.	286	22.00	20.00	20.78	5,942.50				
	III	213	7.50	5.00	6.33	1,347.50				
Sept. 27	I and II	180	18.75	18.50	18.63	3,352.50	471	15.32	7,213.50	6.73
	Scarred, faulty, etc.	270	14.50	13.50	13.83	3,735.00				
	III	21	6.00	6.00	6.00	126.00				
All classes:										
Apr. 19							8,090	29.70	240,300.00	100.00
Sept. 27							7,000	22.49	157,452.50	100.00

Comparative values, by sizes and grades, with percentages each size, of Pribilof sealskins sold at public auction in 1937—Continued

Classes and sales	Grade	Number	High	Low	Average	Total	Total number	Average price	Total amount	Percentage
DYED SAFARI BROWN										
Extra extra large:										
Sept. 27	I and II	8	$27.50	$27.50	$27.50	$220.00	27	$21.19	$572.00	0.21
	Scarred, faulty, etc	19	19.00	18.00	18.53	352.00				
Extra large:										
Apr. 19	I and II	409	43.00	36.50	39.19	16,027.00	773	35.40	27,361.00	5.45
	Scarred, faulty, etc	360	32.00	30.50	31.42	11,310.00				
	III	4	6.00	6.00	6.00	24.00				
Sept. 27	I and II	262	31.50	24.00	30.29	7,935.50	497	26.58	13,208.50	3.95
	Scarred, faulty, etc	235	24.50	17.50	22.44	5,273.00				
Large:										
Apr. 19	I and II	2,555	44.00	35.50	38.78	99,085.00	4,677	33.81	158,139.50	32.96
	Scarred, faulty, etc	2,100	30.50	26.00	28.06	58,922.50				
	III	22	6.00	6.00	6.00	132.00				
Sept. 27	I and II	2,332	31.00	24.00	27.88	65,015.00	4,590	23.79	109,189.50	36.49
	Scarred, faulty, etc	2,241	22.75	17.50	19.67	44,081.00				
	III	17	5.50	5.50	5.50	93.50				
Medium:										
Apr. 19	I and II	3,810	36.50	29.00	31.89	121,490.00	7,399	28.53	211,061.50	52.15
	Scarred, faulty, etc	3,540	28.50	24.00	25.22	89,277.50				
	III	49	6.00	6.00	6.00	294.00				
Sept. 27	I and II	3,782	23.00	18.50	20.93	79,140.50	6,964	18.93	131,821.50	55.36
	Scarred, faulty, etc	3,160	18.00	15.50	16.63	52,560.00				
	III	22	5.50	5.50	5.50	121.00				
Small medium:										
Apr. 19	I and II	614	25.00	21.50	23.49	14,423.00	1,339	19.48	26,088.00	9.44
	Scarred, faulty, etc	700	17.50	15.50	16.45	11,515.00				
	III	25	6.00	6.00	6.00	150.00				
Sept. 27	I and II	270	18.50	17.00	17.83	4,815.00	502	16.58	8,322.50	3.99
	Scarred, faulty, etc	223	16.50	13.50	15.51	3,458.00				
	III	9	5.50	5.50	5.50	49.50				
All classes:										
Apr. 19							14,188	29.79	422,650.00	100.00
Sept. 27							12,580	20.92	263,114.00	100.00
MISCELLANEOUS										
Sept. 27	Unhaired and dressed	76	.50	.50	.50	38.00	147	.50	73.50	100.00
	Unhaired	13	.50	.50	.50	6.50				
	Partly unhaired	58	.50	.50	.50	29.00				

Special sales of Pribilof Islands fur-seal skins in 1937

Date	Number of skins	Description	Price per skin	Total
Jan. 30	70	Dyed safari brown, large	$37.07	$2,594.90
	160	Dyed safari brown, medium	31.90	5,104.00
	160	Dyed safari brown, medium, scarred and faulty	28.91	4,625.60
	70	Dyed black, large	34.03	2,382.10
Feb. 27	16	Raw salted	10.42	166.72
May 31	80	Dyed black, medium	33.12	2,649.60
July 20	4	Dyed black, large	39.91	159.64
	1	Dyed safari brown, medium	31.89	31.89
	2	Dyed safari brown, large	38.78	77.56
Sept. 7	80	Dyed black, medium	33.12	2,649.60
	80	Dyed black, medium, scarred and faulty	25.59	2,047.20
Nov. 30	80	Dyed safari brown, medium	20.93	1,674.40
	80	Dyed safari brown, medium, scarred and faulty	16.63	1,330.40
Dec. 30	80	Dyed black, medium	24.45	1,956.00
	963			27,449.61

Sale at St. Louis, Mo., Sept. 27, 1937, of 214 fur-seal skins received from Japanese Government under treaty provisions

Number of skins	Trade classification	Price per skin	Total
38	Dressed, dyed, and machined, safari brown	$20.00	$760.00
45	Do	22.00	990.00
48	Do	19.50	936.00
32	Dressed, dyed, and machined, safari brown, scarred and faulty	16.00	512.00
36	Do	14.50	522.00
15	Unhaired and dressed	3.50	52.50
214			3,772.50

DISPOSITION OF FUR-SEAL SKINS TAKEN ON PRIBILOF ISLANDS

On January 1, 1937, there were on hand 64,563 fur-seal skins taken on the Pribilof Islands. Of these, 64,545 were at St. Louis, Mo., and 18 at Washington. In 1937, 55,180 fur-seal skins were taken on the Pribilof Islands, of which 8,277 were allotted to the Government of the Dominion of Canada as its share of the season's take and the remaining 46,903 were shipped to St. Louis. Of the skins on hand at the beginning of the year, 42,968 were disposed of, leaving 21,595 unsold, which, with the 46,903 from the 1937 take, make a total of 68,498 on hand on December 31, 1937. The following tables show further details in regard to fur-seal skins taken on the Pribilof Islands, as well as details in regard to other Government fur-seal skins under the control of the Department of Commerce:

Summary of Government-owned fur-seal skins in the custody of Fouke Fur Co., at St. Louis, Mo., calendar year 1937

Source	On hand Jan. 1	Receipts in 1937	Sales in 1937	On hand Dec. 31
Taken on Pribilof Islands:				
Calendar year 1934	7		7	
Calendar year 1935	19,959		19,956	3
Calendar year 1936	44,579		23,005	21,574
Calendar year 1937		46,903		46,903
United States' share of Japanese fur-seal skins: Season of 1936		214	214	
Total	64,545	47,117	43,182	68,480

Summary of all Government-owned fur-seal skins under control of Department of Commerce, calendar year 1937

Source	On hand Jan. 1			Receipts in 1937	Disposed of in 1937		On hand Dec. 31		
	Fouke Fur Co.	Washington office	Total		Sales	Delivered to Canada	Fouke Fur Co.	Washington office	Total
Taken on Pribilof Islands:									
Calendar year 1918, held for reference purposes		7	7					7	7
Calendar year 1923		3	3					3	3
Calendar year 1924		1	1					1	1
Calendar year 1929		5	5					5	5
Calendar year 1930		2	2					2	2
Calendar year 1934	7		7		7				
Calendar year 1935	19,959		19,959		19,956		3		3
Calendar year 1936	44,579		44,579		23,005		21,574		21,574
Calendar year 1937				55,180		8,277	46,903		46,903
Miscellaneous skins held for reference purposes		4	4					4	4
United States' share of Japanese sealskins: Season of 1936				214	214				
Total	64,545	22	64,567	55,394	43,182	8,277	68,480	22	68,502

SHIPMENT AND SALE OF FOXSKINS

The 97 blue and 9 white foxskins taken on St. Paul Island and the 902 blue and 4 white foxskins taken on St. George Island in the season of 1936–37 were shipped from the islands on the *Penguin*, sailing on February 27. The vessel reached Seattle on March 20, and the foxskins were forwarded by express to the Department's selling agents at St. Louis, Mo.

At the public auction sale in St. Louis on April 19, 1937, 510 blue foxskins of the 1935–36 season's take were sold for $15,084.50, an average of $29.58 per skin. The maximum price was $89, obtained for each of a lot of six No. 1 silvery pelts.

On September 27, 1937, there were sold at public auction, at St. Louis, 499 blue and 11 white foxskins taken on the Pribilof Islands in the 1936–37 season. The blue pelts brought $13,511, an average of $27.08 each; and the white pelts brought $131, an average of $11.91 each. The maximum price was $84, obtained for each of two No. 2 extra light pelts.

SEA-OTTER SKINS

Twelve sea-otter skins that had been forfeited to the Government in 1936 were sold at public auction on April 19, 1937, by the Department's selling agents at St. Louis, Mo.

Four sea-otter pup skins were sold for $8, and three other small skins for $60; the remaining five brought $865, the price ranging from $60 to $410 per skin. The total sales of sea-otter skins amounted to $933.

FUR-SEAL PATROL

UNITED STATES COAST GUARD

As in previous years, vessels of the Coast Guard were assigned by the Secretary of the Treasury to patrol the waters of the North Pacific Ocean and Bering Sea for the protection of fur seals and sea otters which have their breeding grounds in Alaskan territory.

The cutter *Onondaga* patrolled between the Oregon-Washington boundary and the Strait of Juan de Fuca from March 20 to April 1 and was then relieved by the cutter *Redwing*, which continued the patrol in that vicinity and northward to Dixon Entrance, southeast Alaska, until April 20. The cutter *Tallapoosa* carried on the patrol from Dixon Entrance to Unalaska from April 20 to May 15, and the sea-otter patrol along the Aleutian Islands from May 28 to August 6.

Vessels of the Coast Guard which patrolled in the North Pacific and Bering Sea, with base at Unalaska, were the cutter *Ingham*, from April 20 to July 28; the patrol boats *Cyane* and *Morris*, from April 20 to July 7 and July 20, respectively; the patrol boat *Daphne*, from July 1 to September 30; the patrol boat *Alert*, from July 15 to September 8; and the cutter *Duane* from July 15 to November 6. The cutter *Northland* made its annual cruise to the Arctic Ocean during the period from May 21 to October 1 and patrolled in Bering Sea and adjacent waters.

BUREAU OF FISHERIES

One vessel of the Bureau of Fisheries, the *Scoter*, participated in the fur-seal patrol for a short time off the coast of Washington in the spring of 1937 during the northward migration of the fur-seal herd. The vessel was stationed at Neah Bay from March 26 to April 9.

A. M. Rafn, special agent of the Bureau, was again stationed at Lapush, Wash., to observe sealing activities and secure compliance with provisions of the fur-seal treaty and the law giving effect thereto in respect to the prohibition of the use of power-propelled boats and of firearms in the taking of fur seals by aborigines. Mr. Rafn was on seal-patrol duty in the vicinity of Lapush from March 29 to May 21.

SEALING PRIVILEGES ACCORDED ABORIGINES

Under the provisions of the international treaty of July 7, 1911, for the protection of the fur seals of the North Pacific, Indians and other aborigines dwelling on the coasts of North America are permitted to hunt fur seals by primitive methods—that is, in boats propelled by oars or sails, and without the use of firearms—except that no one may engage in such sealing who is in the employment of other persons or under contract to deliver the skins to any person.

In 1937 there were taken and duly authenticated by officials of the respective Governments 2,832 fur-seal skins, of which 161 were taken by Indians under the jurisdiction of the United States and 2,671 by Indians of Canada. The details are as follows:

Washington.—Forty-five sealskins taken by Indians of Washington were authenticated. Of these, 10 were from male seals and 35 from females. The skins were taken by Indians of Lapush and Neah Bay in the months from January to May, inclusive, and were authenticated by A. M. Rafn, special agent of the Bureau, and by N. O. Nicholson, superintendent of the Taholah Indian Agency, Hoquiam, Wash.

Alaska.—One hundred and sixteen sealskins taken by natives of Sitka from February to May, inclusive, were authenticated by Bureau employees. Of these skins, 19 were from male and 97 from female seals.

British Columbia.—Indians along the British Columbia coast took 2,671 fur-seal skins in 1937, according to an official report.

JAPANESE SEALSKINS DELIVERED TO THE UNITED STATES

In accordance with provisions of the fur-seal treaty of 1911 there were allotted to the United States 210 Japanese fur-seal skins, or 10 percent of the number taken by Japan on Robben Island in 1937. These skins were received by the Department's selling agents at St. Louis, Mo., on March 28, 1938.

SUBSTATION FOR SEA-OTTER PATROL

In order to provide for the expansion of sea-otter investigations and patrol, a substation was established on Amchitka Island in the western Aleutian Chain during the 1937 season. Workmen from the Pribilof Islands, together with building materials, equipment, and supplies, were carried to the island on the *Penguin*, sailing from St. Paul Island on July 2. Eight natives at Atka were also employed to assist in unloading cargo and in the erection of buildings. On July 6 work was started on the construction of the Bureau's buildings—a bunkhouse 16 by 32 feet for white employees, another 14 by 24 feet for natives, and a storehouse 14 by 32 feet. The *Penguin* sailed again for the Pribilofs on July 10, leaving two white employees to act as observers and three St. Paul natives and three Atka natives to complete the work on the buildings. The vessel returned for these men in September.

O. J. Murie, of the Bureau of Biological Survey, head of a party of investigators who started making a survey of the game resources of the Aleutian Islands in 1936, was on Amchitka Island in the 1937 season and cooperated with the Bureau of Fisheries employees in their observations of sea otters in that vicinity.

FUR-SEAL HABITAT GROUP FOR FIELD MUSEUM

Under a special permit issued by the Secretary of Commerce, a taxidermist of the Field Museum of Natural History, Chicago, visited the Pribilof Islands in 1937 and collected material for use in a fur-seal harem exhibit at the museum. Fur-seal specimens obtained on St. Paul Island consisted of 3 large bulls, 5 other large males, 18 pups, and 15 cows. The skins were of little or no commercial value, having been taken from animals found dead on the rookeries and from cows that were killed accidentally in the drives. Birds for the habitat group were collected on both St. Paul Island and St. George Island and included 21 specimens of the least auklet, 7 of the crested auklet, 9 sandpipers, and at least 1 each of the Pribilof sandpiper, paroquet, tufted puffin, horned puffin, turnstone, snow bunting, squaw duck, goose, hawk, loon, grebe, shearwater, jeiger, eider, fulmar, and gull.

COMPUTATION OF FUR SEALS, PRIBILOF ISLANDS, 1937

By Harry J. Christoffers

The Pribilof Islands fur-seal herd this season showed every outward indication of being in a satisfactory condition. There was a considerable expansion of harem areas, as well as an ample supply of breeding bulls of all classes and a comparatively large number of 3-year-old males in drives at the end of the season.

From a commercial standpoint the Pribilof seals arrived in a very satisfactory manner. They were fairly well scattered throughout the entire season instead of coming in very large numbers for a short period only. Small drives mean less road skins, less damage in health of rejected seals, and, because it is not necessary to kill so fast, better prepared skins. The fact that drives held up so well to the end of July indicated that there were still plenty of 3-year-olds for the breeding reserve.

The number of bulls and other large males, 4 years old and older, in drives during the first part of the season, and to a lesser extent throughout the entire season, is making it increasingly hard to drive and to kill. This is a condition which cannot be remedied and which will become proportionately worse as the herd increases in size. How it will then be possible to hold drives without the loss of a great many animals is difficult to understand. The 4-year-olds are driven again and again throughout the season, an exhaustive process which is probably the cause of many later deaths at sea.

During the latter part of the killing season there is always the problem of cows in drives. As the herd increases, the problem will become more and more acute. This condition requires even more serious consideration than that of the bulls, for a cow driven in a large pod of seals on a warm day soon becomes exhausted. Heretofore there have not been many recorded deaths from this cause, although at times there have been a great many cows in drives. It is during the warm seasons that the most damage occurs, because the harems break up early and large numbers of cows get into the drives. The many cows in drives that do not die from exhaustion and are not killed by mistake are the ones which deserve the most serious consideration. There are no records to show how many of these animals are driven nor how many of them later die from the effects of the exhaustion which they endure at this critical period when they are heavy with milk. The loss at sea from this cause must be enormous, in view of the fact that it represents not only the mother and her pup but also the loss of future unborn pups. It may be one of many contributing causes which together have prevented expected increases of killable seals.

At present it appears that the only way to alleviate this condition is to change the killable class from 3-year-olds to 4-year-olds. There are various reasons why this change seems desirable from the standpoint of benefiting the herd. The 4-year-olds, in general, arrive much earlier than the 3-year-olds. Sealing could be started at the usual time, or possibly a little later, and might be discontinued between July 15 and July 20, or at least before July 25, and still permit the taking of a considerably larger proportion of 4-year-olds than is now secured of the 3-year-olds. If weather conditions caused the seals to arrive later than normal, the 4-year-olds would nevertheless all be on hand by July 20, or at least before July 25.

Early discontinuing of commercial killings would prevent the driving of great numbers of females and 2-year-olds. The driving of females, particularly, should be avoided insofar as possible. As the number of animals in the drives increase, proportionately more die, both during the drives and later on as a result of exhaustion therefrom.

The discontinuing of sealing earlier in the season normally would reduce the number of stagey skins secured.

The only apparent loss from killing 4-year-olds rather than 3-year-olds would be that due to mortality during an additional year at sea. On the other hand, the 4-year-olds have larger, heavier furred skins, and they were killed by the commercial companies in preference to 3-year-olds.

Apparently the only logical way to change over to the killing of 4-year-olds would be to discontinue sealing entirely for a season, or to kill about 25,000 3-year-olds during one year and the next year kill only the proper proportion of 4-year-olds and leave all 3-year-olds for the following year.

It appears certain that it would not be desirable intentionally to kill from two age classes during the same year, although it would thus be possible to discontinue sealing very early by killing half 3-year-olds and half 4-year-olds. This would not work out satisfactorily, for there would be the danger that in order to secure the expected increase in killings each year too many animals would be killed. In a short time there might be a shortage of breeding animals. During the past several seasons when there has been no appreciable increase of killable animals, too many would undoubtedly have been killed if killings had been from both the 3-year-old and 4-year-old classes and if they had been continued until the expected increase were secured. If such a course had been followed, there would now be a grave shortage of bulls, but as killings were from one class only, the condition in this respect is now very satisfactory.

It appears, also, that about the only way to secure a large percentage increase of killable seals, such as occurred in 1929, is to leave a larger proportion of killable seals for breeding purposes. This was clearly demonstrated in the results obtained from leaving increased reserves in 1923 and 1924. From 1923 to 1929 larger proportions of 3-year-olds were reserved for breeding. Probably, also, there were particularly favorable conditions at sea during this period. The returns from leaving these extra breeders were very favorable. We have had no increase for the past several years, however, although we have killed to the end of July and have made no special reserves of breeders.

This season it was the intention to discontinue sealing around July 25, but inasmuch as killings increased at that time and as harems had not broken up to any great extent it seemed desirable to continue killing a few days longer.

The records show that proportionately more 2-year-olds and 4-year-olds were killed in 1937 than in any previous year. A great deal of this increase over the previous 2 years was due to changes which resulted in more accurate measuring of animals killed. The native clubbers formerly selected seals for killing according to their appearance; they recognized the 3-year-olds from certain characteristics. Now they try to kill according to size, regardless of age; that is, under the present system animals are not classed as 3-year-olds if they measure in a 2-year-old or 4-year-old class.

BULLS

A census was again taken of harem and idle bulls. Harems on portions of all rookeries were counted. Some areas on practically all large rookeries had to be estimated. The result should be a fairly accurate but conservative estimate of the number of breeding males on hand. Owing to the cool weather, harems were not badly broken

up at the time of the count. Most of the breeding bulls were still holding their positions and there were many more idle and surplus bulls on hand than during the preceding year, when the weather was abnormally hot.

Although there appeared to be plenty of mature idle and surplus bulls on rookeries and hauling grounds, fighting was not excessive, and there were comparatively few injured bulls. The number of idle bulls and surplus bulls on hand does not seem to have a great deal to do with the amount of fighting, most of which takes place between the early arriving harem bulls, before the cows reach the islands. The later arriving idle and surplus bulls apparently do not feel strong enough to oust the stronger harem bulls from their positions. Later on, when the harem bull has lost his strength, the younger and stronger bulls may drive him from his position. Throughout the season most of the fighting is very short-lived. The weaker bull usually gives way after a jab or two.

It has often been stated that an excessive number of idle and surplus bulls leads to so much fighting that many cows and pups are killed. Some pups and cows are killed by the harem bulls, especially on the flat areas, but not to the extent that might be expected.

Bulls in drives, especially during the early part of the season, cause considerable trouble, as they cannot move as fast as the younger animals and still they do not want to be left behind. Some become exhausted and fall by the wayside. Their skins are valueless.

Computation of breeding cows, based on annual increase of 8 percent, and of average harem, in 1937

Rookery	Breeding cows		Harem bulls, 1937	Average harem		
	1936	1937		1937	1936	Increase (+) or decrease (−) in 1937 from 1936
St. Paul Island:						
Kitovi	17,430	18,824	470	40.05	40.82	−0.77
Lukanin	8,427	9,101	217	41.94	43.66	−1.72
Gorbatch	44,256	47,796	1,000	47.80	46.05	+1.75
Ardiguen	4,186	4,521	107	42.25	45.01	−2.76
Reef	88,895	96,007	1,900	50.53	49.94	+.59
Sivutch	27,203	29,379	450	65.29	62.54	+2.75
Lagoon (actual count pups)	59	51	2	25.50	59.00	−33.50
Tolstoi	52,330	56,516	1,200	47.09	44.92	+2.17
Zapadni	50,291	54,314	1,150	47.23	47.90	−.67
Little Zapadni	25,635	27,686	600	46.14	46.95	−.81
Zapadni Reef	889	960	63	15.24	15.07	+.17
Polovina	18,074	19,520	435	44.87	43.03	+1.84
Polovina Cliffs	9,896	10,688	350	30.54	30.92	−.38
Little Polovina	3,604	3,892	120	32.43	32.18	+.25
Morjovi	6,478	6,996	325	21.53	21.03	+.50
Vostochni	72,114	77,883	2,300	33.86	33.00	+.86
Total	429,767	464,134	10,689	43.42	42.74	+.68
St. George Island:						
North	35,071	37,877	820	46.19	44.39	+1.80
Staraya Artil	26,425	28,539	650	43.91	44.04	−.13
Zapadni	3,729	4,027	200	20.13	20.05	+.08
South	875	945	147	6.43	6.29	+.14
East Reef	8,036	8,679	174	49.88	49.30	+.58
East Cliffs	22,945	24,781	420	59.00	59.14	−.14
Total	97,081	104,848	2,411	43.49	42.84	+.65
Total (both islands)	526,848	568,982	13,100	43.43	42.76	+.67

AVERAGE HAREM

The average harem is determined on the basis of an increase of 8 percent for the cows. The estimated average harem for the two islands this season was 43.43. This may be considered as quite satisfactory.

Aside from actual counts or estimates of males and females, observations indicated that there were sufficient breeding males on the rookeries this season. Even during the last week of July there were idle bulls in the rear of the rookeries, and a fair number of large males or surplus bulls in good condition were in the drives at the end of the season.

It is very important that a proper or sufficiently low average harem be maintained. If the average harem is too large it is clearly indicative that too many males have been killed. It does not hurt the herd to have a low average harem; but a high average harem, or, in other words, a shortage of breeding males, is a sure indication that all cows are not being bred.

Estimated number of harem and idle bulls, approximate ratio of idle bulls to harem bulls, and average harem, 1937

Rookery	Date	Harem bulls	Idle bulls	Total	Approximate ratio of idle bulls to harem bulls	Average harem
St. Paul Island:						
Kitovi	July 19	470	92	562	1:5	40.05
Lukanin	do	217	41	258	1:5	41.94
Gorbatch	July 20	1,000	250	1,250	1:4	47.80
Ardiguen	do	107	12	119	1:9	42.25
Reef	do	1,900	500	2,400	1:4	50.53
Sivutch	do	450	85	535	1:5	65.29
Lagoon	July 19	2		2		25.50
Tolstoi	do	1,200	300	1,500	1:4	47.09
Zapadni	July 18	1,150	300	1,450	1:4	47.23
Little Zapadni	do	600	90	690	1:7	46.14
Zapadni Reef	do	63	31	94	1:2	15.24
Polovina	July 21	435	110	545	1:4	44.87
Polovina Cliffs	do	350	90	440	1:4	30.54
Little Polovina	July 18	120	50	170	1:2	32.43
Morjovi	do	325	90	415	1:4	21.53
Vostochni	do	2,300	475	2,775	1:5	33.86
Total		10,689	2,516	13,205	1:4	43.42
St. George Island:						
North	July 22	820	90	910	1:9	46.19
Staraya Artil	do	650	200	850	1:3	43.91
Zapadni	do	200	70	270	1:3	20.13
South	do	147	10	157	1:15	6.43
East Reef	do	174	45	219	1:4	49.88
East Cliffs	do	420	100	520	1:4	59.00
Total		2,411	515	2,926	1:5	43.49
Total (both islands)		13,100	3,031	16,131	1:4	43.43

PUPS AND COWS

No pup count having been made since 1922, an average rate of increase of 8 percent has been used each year since that date to determine the number of cows and pups in the herd.

The percentage of dead pups determined by actual count in 1922 was again applied to show the number dead on each rookery. For comparative purposes the dead pups are included in the total number of pups. The figures given are probably considerably under the actual

number of dead pups. It is only reasonable to believe that the ratio of dead pups to living pups will increase considerably as the rookeries increase in size. An unfavorable cold wet season also causes a larger percentage of dead pups.

It would be very desirable to make another complete pup count to check up on figures which have been estimated for the past 15 years. It is very probable that as the herd increases in size the rate of growth will become smaller. Unless some sort of epidemic reduces the herd at various intervals, a point will finally be reached where the size of the herd will remain practically constant. This condition must be reached sometime; otherwise seals, the same as any wild animals, would increase to the point where their natural growth would be the cause of their extermination. Some wild animals increase to a certain point and then remain fairly constant in numbers; others increase to a certain point and then are nearly exterminated by disease, parasites, or food shortage.

Insofar as known, there have been no natural causes of a reduction in the rate of growth of the seal herd within the past few years. There is no known condition which causes a shortage of food and, owing to the immense expanse over which the seals feed, it is not believed that there could be a food shortage. There have been, of late, no ravages of uncinaria, which at one time was, and again may be, the cause of losing thousands of pups.

There are always a few seals infested with the mange or some fur- or hair-eating parasite. This year there seemed to be more females than usual with hair and fur badly eaten. This condition has not, however, at any time in the known history of the islands become of any great importance.

Distribution of pups on the Pribilof Islands, Aug. 10, 1937, and comparison with distribution in 1936

Rookery	1937				Total pups, 1936	Increase, 1937
	Living pups	Dead pups	Total pups	Percent dead pups		
St. Paul Island:						
Kitovi	18,547	277	18,824	1.47	17,430	1,394
Lukanin	8,904	197	9,101	2.17	8,427	674
Gorbatch	47,385	411	47,796	.86	44,256	3,540
Ardiguen	4,413	108	4,521	2.39	4,186	335
Reef	94,605	1,402	96,007	1.46	88,895	7,112
Sivutch	28,662	717	29,379	2.44	27,203	2,176
Lagoon	51		51		59	−8
Tolstoi	55,730	786	56,516	1.39	52,330	4,186
Zapadni	53,380	934	54,314	1.72	50,291	4,023
Little Zapadni	26,994	692	27,686	2.50	25,635	2,051
Zapadni Reef	952	8	960	.80	889	71
Polovina	19,221	299	19,520	1.53	18,074	1,446
Polovina Cliffs	10,490	198	10,688	1.85	9,896	792
Little Polovina	3,794	98	3,892	2.51	3,604	288
Morjovi	6,855	141	6,996	2.02	6,478	518
Vostochni	76,263	1,620	77,883	2.08	72,114	5,769
Total	456,246	7,888	464,134	1.70	429,767	34,367
St. George Island:						
North	37,347	530	37,877	1.40	35,071	2,806
Staraya Artil	27,803	736	28,539	2.58	26,425	2,114
Zapadni	3,982	45	4,027	1.12	3,729	298
South	929	16	945	1.72	875	70
East Reef	8,548	131	8,679	1.51	8,036	643
East Cliffs	24,412	369	24,781	1.49	22,945	1,836
Total	103,021	1,827	104,848	1.74	97,081	7,767
Total (both islands)	559,267	9,715	568,982	1.71	526,848	42,134

MORTALITY OF SEALS AT SEA

In 1925, as a result of information secured from branding operations, it was found necessary to increase the mortality rates of seals for the first 3 years of their existence. These mortality rates were used until they were proved to be incorrect; in 1929 the great increase in the number of 3-year-olds available for killing made it necessary to reduce the mortality rates to those used prior to 1925.

The following statement appeared in the report of the computation of fur seals at the Pribilof Islands in 1932:

> It is believed that the large increase in the number of 3-year-olds available for killing during recent years was primarily the result of leaving a larger breeding reserve, rather than to any marked decrease in the mortality rate.

In 1937, 50,800 3-year-old males were killed. This was less than in 1933, when 52,747 were taken. This clearly indicates that for the past 4 years there has been a decrease rather than an increase in the 3-year-old males returning to the islands during the sealing season. It would appear that some abnormal condition must have caused an increase in mortality during this period. If there has been no abnormal condition, the mortality rates should be greater than at present. It is very possible that as the herd increases in size the mortality of pups and young animals also increases. Unless there is a very much greater increase in killable males within the next year or two, mortality rates must be materially increased and necessary adjustments made in all calculations.

At this time all evidence seems to point to the conclusion that the decrease in number of available 3-year-olds is due to closer killing since 1930. In 1929 killings were discontinued on July 24. From 1923 to 1929 proportionately larger breeding reserves were left than during any year since that period. The abnormally large increase of killings in 1929 was, according to the general belief, due to the leaving of larger breeding reserves on and after 1923.

COMPLETE COMPUTATION

The following summary shows the methods used in computing the number of animals in the fur-seal herd of the Pribilof Islands in 1937. The total number of seals of all classes on August 10, 1937, was 1,839,119, or 149,376 more than in 1936. This is an increase of 8.84 percent.

Complete computation of fur seals, Pribilof Islands, as of Aug. 10, 1937

Class	St. Paul Island	St. George Island	Total
Pups, estimated	464,134	104,848	568,982
Breeding cows, 3 years old and over, by inference	464,134	104,848	568,982
Harem bulls, estimated	10,689	2,411	13,100
Idle bulls, estimated	2,516	515	3,031
Yearlings, male and female, estimated:			
Females born in 1936	214,884	48,540	263,424
Natural mortality, 40 percent	85,954	19,416	105,370
Yearling females, Aug. 10, 1937	128,930	29,124	158,054
Males born in 1937	214,883	48,541	263,424
Natural mortality, 40 percent	85,953	19,416	105,369
Yearling males beginning 1937	128,930	29,125	158,055
Yearling males killed in 1937	4		4
Yearling males, Aug. 10, 1937	128,926	29,125	158,051

Complete computation of fur seals, Pribilof Islands, as of Aug. 10, 1937—Con.

Class	St. Paul Island	St. George Island	Total
2-year-olds, male and female, estimated:			
Yearling females, Aug. 10, 1936	119,398	26,967	146,365
Natural mortality, 15 percent	17,910	4,045	21,955
2-year-old females, Aug. 10, 1937	101,488	22,922	124,410
Yearling males, Aug. 10, 1936	119,398	26,967	146,365
Natural mortality, 17.5 percent	20,895	4,719	25,614
2-year-old males beginning 1937	98,503	22,248	120,751
2-year-old males killed in 1937	1,433	429	1,862
2-year-old males, Aug. 10, 1937	97,070	21,819	118,889
3-year-old males, estimated:			
2-year-old males, Aug. 10, 1936	90,285	20,220	110,505
Natural mortality, 12.5 percent	11,286	2,528	13,814
3-year-old males beginning 1937	78,999	17,692	96,691
3-year-old males killed in 1937	40,944	9,856	50,800
3-year-old males, Aug. 10, 1937	38,055	7,836	45,891
4-year-old males, estimated:			
3-year-old males, Aug. 10, 1936	31,734	8,436	40,170
Natural mortality, 10 percent	3,173	844	4,017
4-year-old males beginning 1937	28,561	7,592	36,153
4-year-old males killed in 1937	1,566	772	2,338
4-year-old males, Aug. 10, 1937	26,995	6,820	33,815
5-year-old males, estimated:			
4-year-old males, Aug. 10, 1936	20,634	3,357	23,991
Natural mortality, 10 percent	2,063	336	2,399
5-year-old males beginning 1937	18,571	3,021	21,592
5-year-old males killed in 1937	4	2	6
5-year-old males, Aug. 10, 1937	18,567	3,019	21,586
6-year-old males, estimated:			
5-year-old males, Aug. 10, 1936	15,838	3,147	18,985
Natural mortality, 20 percent	3,168	629	3,797
6-year-old males, Aug. 10, 1937	12,670	2,518	15,188
Surplus bulls, 7 years old and over, estimated:			
6-year-old males, Aug. 10, 1936	9,285	2,136	11,421
Natural mortality, 20 percent	1,857	427	2,284
7-year-old males, Aug. 10, 1937	7,428	1,709	9,137
Surplus bulls, Aug. 10, 1936	(1)	(1)	7,994
Natural mortality, 30 percent			2,398
Remaining surplus for 1937			5,596
Breeding bulls of 1936	12,308	2,746	15,054
Natural mortality, 30 percent	3,692	824	4,516
1936 bulls remaining in 1937	8,616	1,922	10,538
Breeding bulls of 1937	13,205	2,926	16,131
1936 bulls remaining, deducted	8,616	1,922	10,538
Increment of new bulls in 1937	4,589	1,004	5,593
7-year-old males computed for 1937	7,428	1,709	9,137
Surplus bulls computed for 1937			5,596
Total theoretical bull stock for 1937			14,733
New increment of breeding bulls deducted			5,593
Surplus bulls, Aug. 10, 1937			9,140

[1] Estimates have been worked out, insofar as possible, to show the approximate number of seals of each class which should be credited to each island. The seals, however, do not haul out in accordance with figures given. Seals born on either island frequent the other island. They travel promiscuously between the two islands and haul out on either one. The total for both islands, however, is approximately correct.

Recapitulation

Class	Total	Class	Total
Pups	568, 982	5-year-old males	21, 586
Cows	568, 982	6-year-old males	15, 188
Harem bulls	13, 100	Surplus bulls	9, 140
Idle bulls	3, 031		
Yearling females	158, 054	Total, 1937	1, 839, 119
Yearling males	158, 051	Total, 1936	1, 689, 743
2-year-old females	124, 410		
2-year-old males	118, 889	Numerical increase, 1937	149, 376
3-year-old males	45, 891	Percent increase, 1937	8. 84
4-year-old males	33, 815		

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U. S. DEPARTMENT OF COMMERCE
DANIEL C. ROPER, Secretary
BUREAU OF FISHERIES
FRANK T. BELL, Commissioner

Administrative Report No. 32

FISHERY INDUSTRIES OF THE UNITED STATES

1937

By R. H. FIEDLER

APPENDIX III TO REPORT OF COMMISSIONER OF FISHERIES
FOR THE FISCAL YEAR 1938

UNITED STATES
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ADMINISTRATIVE REPORT SERIES

Since the beginning of the Administrative Report Series, considerable confusion has arisen concerning the system of numbering the separates composing it. Inasmuch as the Reports of the Divisions vary in order from year to year, many have found their designations as "Appendix No. I, II, III, or IV" very confusing. To relieve this, it has been decided to number them as "Administrative Report No. —." Inasmuch as 20 separates had already been printed in this series before starting the numbers, it was deemed advisable to begin the numbering with Administrative Report No. 21. Of course, numbers cannot be printed on those already off the press, but for the information of those who wish to know what the first 24 were, they are numbered for filing purposes as follows:

No. 1. Report, Commissioner of Fisheries, 1931.
No. 2. Alaska Fishery and Fur-Seal Industries, 1930.
No. 3. Fishery Industries of the United States, 1930.
No. 4. Progress in Biological Inquiries, 1930.
No. 5. Propagation and Distribution of Food Fishes, 1931.
No. 6. Report, Commissioner of Fisheries, 1932.
No. 7. Alaska Fishery and Fur-Seal Industries, 1931.
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No. 18. Propagation and Distribution of Food Fishes, 1934.
No. 19. Alaska Fishery and Fur-Seal Industries, 1934.
No. 20. Fishery Industries of the United States, 1934.
No. 21. Progress in Biological Inquiries, 1934.
No. 22. Propagation and Distribution of Food Fishes, 1935.
No. 23. Alaska Fishery and Fur-Seal Industries, 1935.
No. 24. Fishery Industries of the United States, 1935.

Note that the last Commissioner's Report was for 1932. Since then its place has been taken by a reprint from the Report of the Secretary of Commerce under the title "Bureau of Fisheries." Inasmuch as it is no longer a Bureau publication, it is not numbered; but it will be supplied to any who request the Report of the Commissioner for any year since 1932.

FISHERY INDUSTRIES OF THE UNITED STATES, 1937 [1]

By R. H. FIEDLER, *Chief, Division of Fishery Industries*

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[1] Administrative Report No. 32, Appendix III to the Report of the U. S. Commissioner of Fisheries, 1938. Approved for publication, June 23, 1938.

FOREWORD

This report constitutes a summary of the activities of the Division of Fishery Industries as well as a review of the fishery statistics collected by the Division during the past year. As its name indicates, this Division of the Bureau is concerned with the activities and welfare of the commercial fisheries and fishery industries and the fishermen and shoresmen engaged therein; the fish canning and preserving industries; and the trade in fishery products. Its functions include the conduct of studies or activities: (1) To determine the extent and magnitude of our aquatic resources and the commercial importance of our fishery industries; (2) to learn the economic condition of fishermen and shoresmen engaged in the fishery industry, their place in the national economy, and what measures can be taken to improve their well-being; (3) to determine the character, utility, and effectiveness of different forms of fishing apparatus and vessels, suggest improvements therein, and discourage the use of those forms which are unnecessarily destructive or unprofitable; (4) to learn the effect of fishing on the supply of fish and suggest measures to promote orderly and sustained production; (5) to study and develop fisheries for hitherto unutilized fishes; (6) to investigate the preservation of fishery products, suggest improved methods, and discourage wasteful practices in this field; (7) to ascertain what use can be made of aquatic products not now utilized to economic advantage; (8) to inquire into the nutritive value of aquatic foods for man and his domestic animals, and promote the consumption of these foods; (9) to ascertain the means and methods of transporting fishery products on land and sea and recommend economical practices; (10) to inquire into the condition and extent of the wholesale and retail trade in fishery products and promote the more orderly marketing of our fishery harvest; (11) to introduce useful foreign methods or processes of capture, preservation, utilization, or marketing fishery products; (12) to handle matters relative to the administration of the act which authorizes cooperative associations of producers of aquatic products; and (13) to conduct the fishery market news service authorized by act of Congress in 1937.

Results of the various technological, economic, and marketing investigations carried on by the Division are published in separate documents as each project is completed, and a brief résumé of each current project is contained in this report. Information obtained from statistical surveys is published in part 2 of this report, which includes all the detailed statistical information that has become available since issuance of the previous report,[2] together with such summarized statements and interpretations of the statistics as are deemed significant and useful.

Part 1. OPERATIONS OF THE DIVISION

COOPERATION WITH OTHER FEDERAL AGENCIES

In line with established policy, the Division cooperated during the year with other Federal agencies where their activities required information or advice concerning the technology, economics, or statistics of the fishery industries, and, similarly, this Division utilized the ex-

[2] Fishery Industries of the United States, 1936, by R. H. Fiedler: Appendix I to the Report of the U. S. Commissioner of Fisheries for 1937, pp. 1–276.

perience of other Federal agencies where they could assist by furnishing data or counsel in the work of this Division.

More specifically, both the economics and technological staffs cooperated with the Federal Surplus Commodities Corporation in connection with its purchase for relief agencies of surplus fish, and with the distribution of this fish to relief clients. The economics staff aided by determining the quantities and location of such stocks of fish to facilitate purchase, while the technological staff cooperated in assembling data on, and in conducting practical demonstrations of, the nutritive value of fishery products and fish cookery.

The technologists of the Division gave courses in canning fishery products to State Extension Service workers at the request of the State Extension Service of the United States Department of Agriculture.

Our technologists also rendered considerable assistance to chemists of the Bureau of Home Economics of the United States Department of Agriculture in assembling data on the chemical composition and food value of the leading commercial species of fish and shellfish. These data are to be incorporated by the Bureau of Home Economics in a revised publication on the composition of principal American food materials.

Chemists of the Food and Drug Administration, United States Department of Agriculture, conferred at length with our technologists for the purpose of obtaining information on methods of determining fatty acid in fish meal and the effect of the presence of relatively large amounts of fatty acid in fish meal on its feeding value.

Assistance was given by the statistical and economics staffs to members of the Rural Electrification Administration in connection with the importance of the commercial fisheries in certain areas of Virginia and North Carolina in which that agency was conducting studies.

Our economists and statisticians were of considerable assistance to members of the staff of the Bureau of Chemistry and Soils in their assembly of historical data, especially of a statistical nature, relating to the domestic manufacture of fish scrap and meal.

In the conduct of several phases of economic and technological work, the Division received the cooperation of the International Fisheries Commission at Seattle, Wash. This included certain technical studies on halibut and halibut-liver oil, and the collection of economic and statistical data on the North Pacific halibut fishery.

The Bureau also has worked with various Federal agencies in obtaining statistical data on our fisheries. In a cooperative arrangement, the Bureau of Agricultural Economics, Department of Agriculture, furnished statistics on the volume of cold-storage holdings of fish and quantities frozen, and the health authorities in Washington, D. C., assisted in obtaining data on the volume of fish handled at the Municipal Fish Wharf and Market in this city. Cooperation was accorded the Bureau of the Census in obtaining for that Bureau figures on the volume of the quarterly production and holdings of fish oils in the United States.

In addition to the specifically enumerated instances of cooperation with other Federal agencies cited above, which are on a continuing basis or were of a more detailed nature, it should be stated that a very close relationship exists between this Division and many of those Federal agencies whose duties require an interest in fish in particular, foodstuffs or feedstuffs in general, or in the various marine activities.

The staff of the Division is in almost daily contact with some one or more of these Federal agencies in the exchange of information of inestimable value to the scientific work of the Federal establishment.

COOPERATION WITH STATE AGENCIES

The Bureau of Fisheries long ago began establishing cooperative relations with the States in fields of mutual interest and endeavor and, in succeeding years, has constantly encouraged, fostered, and expanded this cooperative plan of work. By working closely, whenever possible, with the members of the staffs of various State laboratories, institutions, and agencies, the Division has been able to increase the productivity of the relatively small staff and carry out cooperative investigations at considerably less cost.

During 1937, the following cooperative investigations with various States were conducted:

At Washington State College, Pullman, Wash., the Seattle technological laboratory staff cooperated with Dr. J. S. Carver in carrying on tests with poultry in the feeding of fish oils and meals.

As in past years members of the faculty and staff of the University of Washington, Seattle, Wash., worked in conjunction with the staff at the Seattle technological laboratory in the conduct of various studies or investigations relative to the preservation of fishery products of the Pacific coast. In addition, the University of Washington placed space at the disposal of members of the Seattle laboratory for the conduct of technological studies, for which space was not available in the Bureau's building.

The University of Maryland and the Maryland State Agricultural Experiment Station, College Park, Md., have given excellent cooperation to our technological staff. Free space for the Bureau's laboratories in two of its buildings (discussed elsewhere in this report) has been provided by the University of Maryland, and both the University and the Maryland State Agricultural Experiment Station are conducting in their various laboratories and departments of animal husbandry cooperative studies of the feeding value of fishery byproducts. The members of the staffs of these two institutions who have worked closely with the College Park technological staff are Dr. L. B. Broughton, Head of the Chemistry Department; Dr. W. C. Supplee and Mr. L. E. Bopst, of the Chemistry Department; Dr. L. H. James, Head of the Department of Bacteriology; and Professor M. H. Berry of the Dairy Department. These cooperative investigations in the above-mentioned State universities and institutions are described in greater detail elsewhere in this report.

The technologists of the Division of Fishery Industries cooperated with Mr. L. E. Bopst and other chemists of the Maryland State Chemistry Department in developing methods for determining fatty acid in fish meal and the effect of the presence of relatively large amounts of fatty acid in fish meal on the subsequent feeding value of the fish meal.

Mr. Otto Lang, chemist of the Hooper Foundation, University of California, San Francisco, Calif., who is conducting and improving a State inspection service of fish as food, spent considerable time in conferences with our technologists in connection with the possible application of the Bureau's electrometric test for determining the relative

freshness of fish, and other methods developed by our technologists, to his studies for the State of California.

Our technologists continued their active cooperation, during the past year, with the Minnesota and Virginia State Departments of Markets in connection with the extension and improvement of State marketing grades for fishery products sold in those States. In Virginia one of the Bureau's technologists assisted the State inspector in preparing grades for herring roe, discussed in detail elsewhere in this report.

In the conduct of its statistical research work, the Bureau obtains unusual cooperation from various States. The statistical surveys of the fisheries in the various States bordering on the Great Lakes, in the Pacific Coast States, and in Maryland, Virginia, and Delaware have been greatly facilitated by the cooperation obtained from the fishery agencies in these States. With this aid it is now only necessary for the Bureau to conduct partial surveys in these States to supplement the data available from the fishery agencies.

In addition, in nearly every other State where commercial fishing is prosecuted, some type of cooperation in its statistical work is rendered the Bureau by the State fishery agencies or other organizations. This makes it possible for the Bureau to make statistical surveys of a greater portion of our fishery industries than otherwise would be possible.

COOPERATION WITH FISHERY ADVISORY COMMITTEE

Members of the staff of the Division worked very closely during the year with the Fishery Advisory Committee of the Business Advisory Council for the Department of Commerce. This work took its principal form in the planning of demonstrations and preparation of informative material for the meeting of the Committee in Washington, D. C., on January 21 and 22, 1938.

As a part of the program arranged for the members of the Committee, the Division gave numerous demonstrations of its work. These included an historical review and discussion of current trends of our commercial fisheries, by the Chief of the Division, with the use of a specially prepared series of charts. The modern methods employed by the Bureau in preparing the large volume of fishery statistics which are collected and disseminated by the Bureau were demonstrated and explained by E. A. Power. Demonstrations of technological studies included an experimental method for the canning of the blue crab by N. D. Jarvis; the electrometric method for determining the freshness of fish, by J. M. Lemon and M. E. Stansby; a new method of treating fish by "controlled smoke" to obtain a uniform product, by W. T. Conn; experiments looking toward reduction of bacteria in fish by use of ultraviolet rays, by J. F. Puncochar; and methods for protein analysis of fish, by S. R. Pottinger. Recent studies relating to the food value of fish, and especially pointing out the large reserves of vitamins, proteins, and essential minerals contained in seafood, were discussed by J. R. Manning and others of the technological staff. These discussions were concerned with nutritional studies on fish oils, by C. F. Lee; fish proteins, by W. B. Lanham; and minerals in fishery products, by Hugo Nilson.

The Division also aided extensively in the planning of the seafood dinner held at the Mayflower Hotel on January 21, 1938, by members

of the Fishery Advisory Committee and others. It further contributed numerous articles and graphic charts for the pamphlet entitled "Facts—The Key to Progress."

EXHIBITS AT EXPOSITIONS

During 1937, the Division continued its supervision of the Bureau's exhibits at the Texas Centennial Central Exposition at Dallas, Tex., and the Great Lakes Exposition at Cleveland, Ohio, both of which ran during second year; and arranged for displays for the Florida State Fair in Tampa, Fla., and the International Exposition of Paris, France. These exhibits attracted considerable attention from visitors and assisted materially in bringing before our people the need and value of fishery conservation.

TEXAS CENTENNIAL CENTRAL EXPOSITION

At the conclusion of this exposition, the main feature of the Bureau's display, consisting of a sport-fishing diorama, was sent to Tampa, Fla., and installed in the fisheries building of the Florida State Fair. This will remain on display there for the Pan American Exposition in Tampa in 1939.

GREAT LAKES EXPOSITION

At the conclusion of this exposition a portion of the display was loaned to the University Museums of the University of Michigan, Ann Arbor, Mich., for display in the fishery hall. This consisted of the mechanically-operated diorama depicting the effect of thermal conditions in Lake Erie on the commercial capture of fish, a diorama of fish-hatchery operations, models of Great Lakes fishery apparatus, a display explaining net preservative treatments, and miscellaneous canned fish products. Another portion of the display, consisting of a panel of articles made from fishery products, was loaned to the Conservation Division of the State of Ohio and placed on display in the Bureau's fish hatchery building at Put in Bay, Ohio.

INTERNATIONAL EXPOSITION AT PARIS, FRANCE

The Division prepared an exhibit of the Bureau's activities for use in the United States Government Building at this exposition in 1937. This consisted of a series of 24 colored transparencies of 16 by 20 inches each, arranged in a wall panel, and depicted the Alaska salmon fisheries, the Bureau's research work on fishery technology and biology, and its work in the propagation and distribution of fish. Each transparency was titled in both English and French. The Bureau was allotted $250 for the preparation of this exhibit. At the conclusion of the Exposition the transparencies were returned to the Washington office.

NEW YORK WORLD'S FAIR, AND GOLDEN GATE EXPOSITION, 1939

Members of the Division have devoted considerable time to plans for Bureau exhibits at the New York World's Fair, 1939, and the Golden Gate Exposition, 1939, at San Francisco, Calif. Federal displays or exhibits for these two fairs will not be constructed by the various Government agencies, as heretofore. Rather, these agencies

will advise the Federal Commissions for the fairs of their respective activities, and these then will be incorporated in theme dioramas, which are to be constructed by the Fair Commission for display in the respective Federal buildings at the two fairs. The work of the Bureau at the New York Fair will be depicted in the following themes: Conservation, food, industry, recreation, and territories; and in the conservation theme at the Golden Gate Exposition. A separate Government committee has been appointed to develop plans for each theme and members of the Division's staff are acting on the theme committees, as indicated above. For the science display at the Golden Gate Exposition the Bureau is lending its panels depicting the migration of the Alaska salmon, and the eels of the Atlantic Ocean.

Members of the Division are also working in close cooperation with the New York World's Fair Administration on the development of a special Fishery Building to house industry exhibits, both foreign and domestic, and displays of various State fishery agencies, conservation leagues, and others. This is the first time a fair administration has made plans for a separate building of this type. The fair administration is desirous of having a display in this building by the Bureau of Fisheries, but to this date it has been impossible to arrange for it since funds for the purpose have not been provided.

SEVENTH WORLD'S POULTRY CONGRESS, 1939

Members of the Division also are cooperating with the United States Commission for the Seventh World's Poultry Congress in the preparation of an exhibit for display at Cleveland, Ohio, in July 1939, during the proceedings of the Congress. The Bureau's exhibit will consist of displays showing sources and manufacture of fish meal, oil, ground oyster shells, and other aquatic products which are used as feeds for poultry. The poultry industry is one of the principal consumers of these domestic fishery products, and it is expected the display will be of unusual benefit to industries manufacturing these commodities.

GENERAL

During the year the Division prepared exhibits for display at various sportsmen's fairs, and for several trade and professional association meetings which convened in Washington, D. C. These exhibits for use at the sportsmen's fairs consisted mainly of dioramas depicting the research work of the Bureau relative to fish propagation and oyster culture, while those for use at the trade meetings consisted of displays of the food value of fish, and charts and graphs showing the magnitude of the fisheries in the United States and Alaska.

During the past year the Bureau has experienced an unusual demand for display exhibits at various sportsmen's shows, fairs, and trade meetings and for window displays and school exhibits. These requests have come from groups in many parts of the country. Because of the costs involved the Bureau has been unable to fill these requests, except where it had material available from past fairs and where costs for transportation were not involved. This desire for exhibit material on the part of the general public indicates to the Bureau that many of our people are greatly interested in fishery conservation work, and that if it were possible to fill all the requests a greater portion of our population might obtain a clearer insight into the need for wildlife conser-

vation, and a better knowledge of what can be done to promote conservation.

ECONOMIC AND MARKETING INVESTIGATIONS

There is a constant demand upon the Division of Fishery Industries for studies of the economics of the commercial fisheries, including investigations having application to the various functions of the marketing of fishery commodities. It has been possible to undertake only a limited program of long-time or continuing studies of this kind with available personnel and funds during recent years. It was necessary to further curtail work of this type during the past year due to the large volume of time required of the regular staff in connection with the planning and organizing of the Market News Service, to be discussed later in this report. However, as is customary each year, many short-time economic studies were made in order to satisfy the urgent demands placed upon the Division. Such studies most frequently are conducted preliminary to or closely associated with administrative activities of the Bureau and usually are not published. Results of some of these studies which were made during the past year are discussed briefly in the following paragraphs.

SURPLUS-FISH SITUATION

A study of the surplus-fish situation was made by the staff of the Division during March, and the findings were presented on March 29, 1938, by the Chief of the Division at the hearings before the Committee on Merchant Marine and Fisheries of the House of Representatives on H. R. 9765 and S. 3595 relating to the purchase and distribution of products of the fishery industry. The study made in the Division developed the following information:

Frozen and cured fish.—As of March 15, 1938, the holdings of frozen fishery products in cold-storage warehouses in the United States amounted to 45,700,000 pounds. This is 13,200,000 pounds in excess of the normal or 5-year average of the holdings as of March 15 and 5,900,000 pounds less than the holdings as of March 15, 1937. On March 15, 1937, the holdings were 22,371,000 pounds above normal, or 5-year average as of that date. Thus, the excess holdings this year on March 15 over the 5-year average are 9,100,000 pounds less than the holdings as of March 15, 1937, over the 5-year average, at that time. Under congressional authority in 1937, the Federal Surplus Commodities Corporation purchased a little over 12,000,000 pounds of fishery products (most of which was frozen) at a cost of about $621,000.

The excess holdings as of March 15, 1938, over the 5-year average as of this date, were made up principally of dressed and filleted cod, haddock, and pollock, and shellfish (mostly shrimp), sablefish, rosefish, salmon (mostly fall and pink varieties) and halibut. On March 15, 1937, the excess over the 5-year average as of that date was accounted for mainly by the large holdings of whiting, various species of groundfish (cod, haddock, pollock, etc.), and rosefish.

On March 15, 1938, the holdings of cured herring amounted to 13,200,000 pounds, or about 4,200,000 pounds less than on the same date a year ago, but about 2,500,000 pounds more than the 5-year average. On March 15, 1937, the holdings of cured herring were

about 6,400,000 pounds more than on the same date in 1936 and 7,500,000 pounds more than the 5-year average as of that date.

In 1937, the landings of fish at the principal New England ports (Boston and Gloucester, Mass., and Portland, Maine) where the bulk of the catch of fish by New England vessels is landed, amounted to 388,000,000 pounds or about 26,300,000 pounds less than the landings at these ports in 1936. Decreases were recorded mainly in the landings of mackerel, whiting, pollock, and rosefish. Several of these species are the same as those which had large cold-storage holdings on March 15, 1937. Several other species recorded minor decreases. Increases were recorded mainly by cod, hake, cusk, and flounders. Among these species which had excess holdings as of March 15, 1938, over the 5-year average as of this date, there were cod, hake, and cusk.

In 1937 there were 168,200,000 pounds of fishery products frozen in the United States compared with freezings of 179,300,000 pounds in 1936 and a 5-year average of 130,000,000 pounds. In 1937, it is estimated that 183,000,000 pounds of frozen fish were withdrawn from cold storage as compared with 159,000,000 pounds in 1936 and a 5-year average of 125,700,000 pounds.

Canned fish.—Figures on the estimated holdings of canned fish were obtained by telegram and letter from various fishery associations. It is assumed the following figures thus obtained refer to stocks held by packers.

The holdings of canned tuna, in standard cases of 48 one-half pound cans to the case, as of March 15, 1938, were reported as 649,000 cases (15,600,000 pounds) compared with 247,000 cases (5,900,000 pounds) on the same date a year ago. No data are available as to the comparison of the holdings with a 5-year average.

The holdings of canned shrimp, in standard cases of 48 No. 1 cans to the case, as of March 15, 1938, amounted to 290,000 cases (4,400,000 pounds) compared with 60,000 cases (900,000 pounds) on the same date a year ago, and 118,000 cases (1,800,000 pounds) on March 15, 1936. There is no figure available as to the 5-year average as of March 15.

The holdings of canned oysters, in standard cases of 48 No. 1 cans to the case, were 122,000 cases (1,830,000 pounds) as of March 26, 1938, and 123,000 cases (1,850,000 pounds) as of April 1, 1937. No data are available as to the 5-year average.

It is understood the carry-over of canned alewife roe in the Chesapeake Bay area is considerably greater as of March 15 this year than the holdings as of March15 a year ago.

There was no surplus stock of canned California sardines, in 1-pound oval cans, as of March 26, 1938, and the same condition obtained in March 1937. Most of the pack of California sardines is put up in 1-pound oval cans.

The holdings of canned Maine sardines in cases containing an average of about 35 pounds of fish to the case, were 350,000 cases (12,250,000 pounds) as of March 15, 1938, and about 215,000 cases (7,500,000 pounds) as of the same date a year ago. Information was not available as to the amount of the 5-year average as of March 15.

No data are available on the situation with respect to canned mackerel in California. It is doubtful, however, whether there is any

appreciable carry-over, since the pack in 1937 was considerably less than in 1936 or 1935.

Reports indicate that the holdings of canned salmon of all kinds, in standard cases of 48 1-pound cans to the case, as of February 28, 1938, amounted to 3,429,000 cases (165,000,000 pounds) compared with 1,337,000 cases (64,200,000 pounds) on February 28, 1937. According to an estimate obtained from the annual statistical number of the Pacific Fisherman, dated January 25, 1938, the 5-year average amounted to about 2,200,000 cases (105,600,000 pounds).

A summary of the above information indicates that the holdings of fishery products in the United States, on which data were obtained, approximated 260,000,000 pounds on March 15, 1938. This represents an excess of approximately 80 to 100 million pounds above normal holdings.

An act, Public No. 542, to authorize the purchase and distribution of products of the fishing industry was approved on May 25, 1938. It provides:

> That, out of any funds available to the Federal Surplus Commodities Corporation, not to exceed a sum equal to the difference between $1,000,000 and the sum expended by such Corporation in carrying out the provisions of the joint resolution entitled "Joint resolution to make funds available to carry out the provisions of existing law authorizing the purchase and distribution of products of the fishing industry," approved April 12, 1937, may be used by such Corporation for the purpose of diverting surplus fish (including shellfish) and the products thereof from the normal channels of trade and commerce by acquiring them and providing for their distribution through Federal, State, and private relief channels.

IMPROVED COLD-STORAGE STATISTICS

Progressive fish dealers in our markets are cognizant of the approximate volume of current supplies of fresh fish in their marketing area. The amount of fish in cold storage is not so apparent to them, yet such supplies, which have an important influence on the markets for fresh fish, are frequently many times the volume of fresh fish on hand at any given time. In order that interested parties may be apprised of the amount of fish in cold storage and quantities frozen, the Division, with the cooperation of the Cold Storage Section of the Bureau of Agricultural Economics, publishes monthly and annually bulletins which include this information.

In order that these reports may be of the greatest value to interested parties, this Division and the Bureau of Agricultural Economics make frequent revisions in the questionnaires submitted to cold-storage firms in order that new commodities or those of growing importance may be incorporated in the report. Thus, separate classifications have been added in recent years for fillets of various species as their importance increased in our markets; a new classification was added for rosefish, which is the product of a virtually new fishery; and another was added for swordfish, due to the increasing volume of imports of this commodity in the frozen state from Japan and subsequent storage in domestic warehouses.

New species classifications will be added on July 15, 1938, for scallops, a large volume of which also is imported from Japan; for shrimp, the domestic freezing of which has increased rapidly in recent years; and for sea crawfish or spiny lobster tails which have been imported in growing quantities, especially from South Africa.

Statistics of quantities of frozen fish moving in and out of cold storage and the amount of fish in cold storage are given daily and weekly, respectively, in the fishery news releases issued by the Division's market news offices in Boston, Mass., and New York, N. Y. This service is discussed in greater detail elsewhere in this section.

UNITED STATES FISHERIES OFF FOREIGN COUNTRIES

A study made during the year shows that about 14 percent of the value of the catch of the domestic fisheries is represented by products taken off foreign coasts. Specifically, the sources and classes of the more important of these products were as follows: Off Newfoundland and Nova Scotia, principally cod, haddock, and other groundfish, 151,000,000 pounds, valued at $4,600,000; off the west coasts of Latin American countries, mainly tuna and tunalike fishes, 121,000,000 pounds, valued at $5,900,000; off British Columbia, largely salmon and halibut, 16,000,000 pounds, valued at $1,000,000; off the east coast of Mexico (Campeche Bank), chiefly red snappers and groupers, 4,000,000 pounds, valued at $200,000; and off Australia, 1,508 whales (weight undetermined), from which were produced whale and sperm oil valued at $1,300,000. It will be observed that the total value of the fisheries off foreign coasts to domestic fishermen was about $13,000,000.

MIGRATORY FISH OF THE ATLANTIC AND GULF COASTS

Members of the Division's staff devoted a great deal of time during the year to the preparation of historical statistics and graphic charts of the catch of migratory fish and shellfish common to the Atlantic and Gulf coasts for use in the deliberations of the two eastern zones of the National Planning Council of Game and Commercial Fish Commissioners at their meeting with officials of this Bureau in Atlantic City, N. J., on February 6, 1937.

The data prepared in this Division covered the trends of the catch of 17 important migratory fish and shellfish. These data were supplemented by members of the staff of the Division of Scientific Inquiry to include discussions of the physical characteristics and habits of these species, and all the material was included in Special Memorandum No. 3239, entitled "Migratory Fish of the Atlantic and Gulf Coasts." The species covered by the report were cod, haddock, flounders, mackerel, sea herring, whiting, scup, sea bass, shad, alewives, croakers, squeteagues, Spanish mackerel, mullet, lobsters, crabs, and shrimp.

COMMERCIAL FISHERIES OF THE WORLD

On the basis of the most recent available data, the United States, including Alaska, ranks first in value of annual yield of fishery products among the countries of the world and is exceeded only by Japan in the volume of the yield. The catch by commercial fishermen of the United States, based principally on data for 1936, amounted to 4,800,000,000 pounds, valued at $93,000,000, while that of Japan, which is partly estimated, amounted to 6,600,000,000 pounds, valued at $87,000,000. Other countries whose annual commercial fisheries catch exceeded 1 billion pounds were Union of Soviet Socialist

Republics, England (including Scotland, Northern Ireland and Wales), China, Norway, Canada and Germany. The world's annual commercial catch of fishery commodities is about 30,000,000,000 pounds, valued at $730,000,000.

DOMESTIC MARKETS FOR LOBSTERS AND SPINY LOBSTERS

In view of the interest manifested in connection with the increasing imports of lobsters and spiny lobsters from foreign countries, the Division conducted a study of the trend in this trade.

Preliminary data, compiled by the Bureau of Foreign and Domestic Commerce, show that the imports of fresh and frozen products of both of these crustaceans during 1937 amounted to 14,700,000 pounds, and canned products 800,000 pounds, or a total of 15,500,000 pounds, exceeding the total imports in 1936 by 29 percent, and the average of the 10 years ending in 1936 by 43 percent. This increase is reflected entirely in the fresh and frozen products, there having been a downward trend in recent years in the imports of the canned commodity.

Large increases were recorded for imports of fresh and frozen lobsters and spiny lobsters during 1937. Specifically, the imports of fresh and frozen lobsters, which come almost entirely from Canada, increased from 8,800,000 pounds in 1936 to 10,700,000 pounds, or 21 percent, in 1937. This increase was most interesting in view of the fact that for several years prior to 1937 the total imports of this commodity had not reached 9,000,000 pounds. The imports of fresh and frozen spiny lobsters increased from 2,300,000 pounds in 1936 to 4,000,000 pounds in 1937, or 74 percent. Probably even of more interest in connection with the imports of fresh and frozen spiny lobsters is the fact that as late as 1932 imports amounted to only 763,000 pounds and during the decade prior to 1934 receipts from foreign countries had never exceeded 1,200,000 pounds.

The principal sources of our imports of spiny lobsters, in order of their importance, are Union of South Africa, British West Indies, Mexico and Cuba. Small quantities come from other tropical and subtropical countries.

Among the important countries which supply us with fresh and frozen spiny lobsters, the Union of South Africa has made most rapid strides in marketing her product in this country. Imports from that country increased from 1,020 pounds in 1934 to 130,000 pounds in 1935, 570,000 pounds in 1936, and 1,700,000 pounds in 1937. Our imports from the British West Indies have grown nearly as rapidly, increasing from 290,000 pounds in 1934 to 1,100,000 pounds in 1937. Cuba's shipments to this country increased from 38,000 pounds in 1934 to 207,000 pounds in 1937. Imports from Mexico have varied between 840,000 pounds and 940,000 pounds during the past 4 years.

The domestic catch of lobsters in recent years has varied from about 10,000,000 pounds to 14,000,000 pounds and that of spiny lobsters from 1,500,000 pounds to 1,900,000 pounds.

IMPORTATION OF COTTON FISH NETTING

The imports of cotton fish netting from foreign countries has been consistently increasing during the past 4 years, according to foreign trade statistics compiled by the Bureau of Foreign and Domestic

Commerce. In 1934, when the first import statistics of this commodity were published, our total receipts from foreign countries amounted to 338,000 pounds, valued at $124,000. Preliminary data show that in 1937 imports amounted to 846,000 pounds, valued at $255,000, representing increases of 150 percent in volume and 106 percent in value in the 4-year period.

Of especial interest with relation to the domestic market for foreign produced netting is the fact that while in each of the years for which data are available Japan contributed most of our imports of this commodity, her percentage of the total volume of imports increased from 63 percent in 1934 to 95 percent in 1937. Other countries from which cotton fish netting was received in this country in 1937 were Netherlands and United Kingdom, with very small quantities from Canada, Germany, France, Belgium, and Czechoslovakia.

INTERCHANGEABILITY OF USES OF OILS AND FATS

In publications of the Bureau and in previous annual reports of this Division the technical and economic aspects of the general interchangeability of the uses of all saponifiable oils and fats of animal and vegetable origin, and their effect on markets for and uses of fish oils, have been discussed in considerable detail. Because of the influence of this factor on many important American industries, it has become of increasing interest and importance during the past year. Particularly has it been a factor to be considered in the Government's program of reciprocal trade agreements. Consequently, technologists and economists of this Division spent considerable time during 1937 in assembling special data on this subject from the Bureau's files for officials of the State Department, the Federal Trade Commission, the Bureau of Customs of the Treasury Department, members of Congress, and representatives of trade associations.

ACTIVITIES OF THE FISHERY COMMITTEE OF THE NATIONAL ASSOCIATION OF MARKETING OFFICIALS

The Fishery Committee of the National Association of Marketing Officials was appointed in October 1936 at the association's convention in Nashville, Tenn., to deliberate on problems in connection with the marketing of fish which come before the association. While this is a very new committee, it already has shown much interest in fishery work and bears promise of most fruitful accomplishments in the future.

The members consist of J. H. Meek, Director, Division of Markets, Virginia, Chairman; Charles M. White, Chief, Division of Markets, Maine; and L. M. Rhodes, Commissioner of Markets, Florida. It will be observed that in each instance the members of the committee represent marketing agencies of States which are important in the commercial production of fish and shellfish.

The first meeting of this committee, following its appointment, was held in Washington, D. C., on April 26, 1937. On that occasion, as a means of developing general policies and plans for study, it discussed nine questions having important bearing in connection with the marketing of fish. Answers which reflected the opinions of the committee were then reported at the Nineteenth Annual Convention of the National Association of Marketing Officials, held in New York

City on December 18, 1937. The questions and answers as developed by the committee were as follows:

1. How can the State officials cooperate in the conduct of the Market News Service for fish, established July 1, 1937, by the United States Bureau of Fisheries?

It appears that the Market News service for fish in each State can be coordinated with the State Market News service for agricultural commodities.

2. How can the State officials aid cooperative marketing associations of fish producers?

Give them the same support that is given producers of agricultural commodities.

3. Should the Federal Government extend loans to Fishery Cooperatives?

In the same way that loans are extended to cooperatives handling agricultural commodities.

4. Should the State marketing or other State agencies take a greater interest in conducting economic studies of the marketing of fishery products?

Where there are economic studies relating to agricultural commodities, similar studies should be made relating to the marketing of fishery products.

5. Should the State marketing or other State agencies aid in the conduct of a fishery extension service to aid producers in marketing improved fishery products and to acquaint housewives with the food value of fishery products?

The same as agricultural commodities or other foods.

6. Should schools and colleges give consideration to the teaching of fishery economic and technical subjects—especially in those States where fishing is an important industry?

This seems essential if proper progress is made.

7. Should a Federal-State inspection service, of voluntary nature, be established for fishery products?

It is exceedingly important that a voluntary Federal-State inspection service for fishery products be established without delay.

8. Should consideration be given to the establishment of small inexpensive warehouses at important fish-production centers to hold, temporarily, surplus supplies of fresh fish pending more favorable marketing conditions?

This is a matter that should be given careful consideration and gradually developed to meet the needs of individual cases.

9. Should consideration be given the development of a fishery conservation plan along the line of the soil conservation subsidy?

This is needed to protect, conserve, and develop the industry.

The Chief of the Division addressed the New York Convention of the National Association of Marketing Officials on December 18, using as his subject "Outline of Fishery Market News Service." This address was received with considerable interest, especially in connection with the application of this new work of the Division in the various States represented by the delegates.

At the time of the convention of the Atlantic States Division of the National Association of Marketing Officials, held in Washington, D. C., in April 1938, members of the association's Fishery Committee, marketing officials from other coastal States, the writer and members

of his staff, met to discuss policies of general cooperative activities in connection with the Division's new fishery market news service. It was pointed out by the Division's staff that funds were so limited for this new work that it would be impossible to communicate by telegraph on a daily basis the voluminous market information collected by the Division to State marketing offices for their dissemination to interested parties. Consequently, it was the concensus of the meeting that for the present these market news reports should be mailed to the State agencies and those having facilities would develop means for dissemination. It was further suggested that as the States developed suitable procedures for dissemination, adequate funds might be made available by the States to cover telegraph costs or to conduct some of the work of collection of data in their States, which would relieve the Division of portions of its expense in order that it could take over communication costs. The policy of mailing these market news reports to State marketing offices has been followed by the Division and some of the States have already indicated that they are conducting studies in connection with the marketing of fish in order that they may more intelligently disseminate this new type of information.

TRENDS OF THE BLUE CRAB INDUSTRY

An interesting geographical movement of the blue crab industry was revealed by a study of the official statistics of the products of this industry. As late as 1930 the States of Maryland and Virginia dominated the fishery for this crustacean, accounting for nearly 68,759,000 pounds. In that year the entire marine coastal area of the South Atlantic and Gulf States contributed only 7,024,000 pounds to the domestic catch. By 1936 the Chesapeake production had decreased to 43,670,000 pounds while that of the South Atlantic and Gulf States had increased to 29,831,000 pounds. The outstanding States contributing to this latter production in 1936 were Louisiana, 12,942,000 pounds; North Carolina, 6,591,000 pounds; and Florida, 3,194,000 pounds. With the development of this more southern crab fishery, fresh-cooked crab meat from the area is becoming a factor of increasing importance in the northern market.

For instance, the production of fresh-cooked crab meat in Louisiana in 1931 amounted to only 175,000 pounds, while in 1936 it had reached 1,035,000 pounds. During the same period the production of fresh-cooked crab meat in North Carolina increased from 188,000 pounds to 432,000 pounds, and in Florida from a practically nonexistent industry in 1931 to 316,000 pounds in 1936. This rapid growth of the fresh-cooked crab meat industry in the more southern States is contrasted with the decrease in the volume of fresh-cooked crab meat produced in the Chesapeake States from 5,794,000 pounds in 1931 to 3,581,000 pounds in 1936.

Of interest in connection with the domestic production of crab meat and its changing geographic trend are imports of foreign canned crab meat. According to preliminary data, imports of this commodity, which emanates principally from Japan, amounted to 11,157,000 pounds in 1937, which exceeds the imports in any year since 1931. The average imports for the 5 years prior to 1937 were 9,116,000 pounds.

THE ATLANTIC TUNA FISHERY

The fishery for tuna on the Atlantic coast in past years has been conducted almost entirely by sport fishermen; however, limited quantities have been taken incidentally in fisheries conducted primarily for other species. The interest in the sport fishery for this species has increased in recent years, and a considerable volume of the sportmen's catch frequently finds its way into our markets. In the capture of tuna, sport fishermen usually employ harpoons adapted from the swordfish fishery, hand lines, or troll lines. During the past year, several fares of tuna were reported landed at New England ports by vessels operating purse seines, which are one of the primary accepted gears used in the commercial fishery for tuna and tunalike fishes on the Pacific coast. Reports, of especial interest at this time, are that a modern purse seine vessel, the *Western Explorer*, has sailed from the Pacific coast through the Panama Canal to engage in a commercial fishery for tuna and mackerel in the New England fisheries and that the New England commercial fishery interests have already produced limited packs of canned tuna.

The commercial exploitation of this species on the Atlantic coast will be observed with great interest, especially in view of the rapid growth and present importance of the tuna industry in California where the Pacific coast industry is centered. It is most interesting to observe that the catch of tuna and tunalike fishes in California was of little consequence prior to about 1910, but today the value of the catch of these species ranks second only to salmon among all of the fisheries of the Pacific Coast States. The catch of tuna and tunalike fishes in 1936 amounting to 132,470,000 pounds, valued at $6,565,000 to the fishermen. Tuna also ranks among the most important fisheries of the world. Based upon the most recent available data, the world's annual catch amounted to 675,000,000 pounds, valued at about $24,000,000. This represents about 2 percent of the volume and 3 percent of the value of the catch of the world's fisheries for all species. Japan alone contributed 68 percent to the world's catch of tuna. Following in order were the United States with 21 percent; Spain, 4 percent; France, 3 percent; and Portugal, 1 percent. Other countries whose annual catch exceeded 1,000,000 pounds were Italy, Algeria, Tunisia, and Tripolitania.

NORTH PACIFIC HALIBUT FISHERY

During the past year George Roger Chute, assistant fishery economist, continued his economic study of the halibut fishery and industry of the North Pacific which was discussed in last year's report. This investigation covers a study of halibut vessel operation, transportation, warehousing, merchandizing practices, consumer attitude toward halibut, and a chronology of the fishery from its inception on the North Pacific.

GEOGRAPHICAL TRENDS IN THE PRODUCTION OF CANNED OYSTERS

The earliest oyster canning industry of any consequence in this country was centered on Chesapeake Bay. As late as 1921 Maryland was the principal producing State for canned and hermetically sealed oysters, contributing 153,000 standard cases to the United States total pack of 442,000 cases. More recently, the demand for shucked stock

and oysters in the shell has so completely utilized the available supply in the Chesapeake area that the canning of this mollusk in this region has been almost abandoned.

As the pack decreased in the Chesapeake Bay, increasing quantities of oysters were canned on the Gulf coast to supply the important Middle Western market, and in 1936 the pack in Mississippi of 223,000 standard cases was more than half that of the entire Atlantic and Gulf coasts. However, a newer and most important source of canned oysters is the State of Washington, where the Japanese or Pacific oyster is canned. In 1931, the pack in Washington was less than 8,000 standard cases, but by 1936 the oyster canning industry in Washington had grown to the point where its pack amounted to 119,000 cases or 23 percent of the domestic production.

COMMERCIAL ASPECTS OF SEAWEED INDUSTRIES

Considerable interest is shown in the various seaweed industries of the United States as is evidenced by the numerous inquiries which the Bureau receives and by the relatively large number of business men interested in the possibilities of new ventures and developments in the utilization of seaweeds. During the past year, several large chemical manufacturers sent representatives to confer with the Division's technologists regarding the preparation and utilization of sodium alginate, a widely used product made from kelp. Much interest is also shown in kelp meal as a mineral supplement for livestock rations.

With special reference to eel grass, it is of interest that this seaweed once furnished a considerable industry in New Jersey, Virginia, Maryland, and elsewhere along the Atlantic coast. An investigation made by the Division during the year brought out the fact that the current domestic requirements of this product are now furnished almost entirely from foreign sources. With the depletion of domestic beds of eel grass, the manufacturing consumers, who found it especially suitable as an insulating material, considered it necessary to import supplies from Nova Scotia, but more recently the supply has become limited there. It has, consequently, become necessary to import a European seaweed, although it is shorter and in other ways less suitable than the native product.

MARKETS FOR PERIWINKLES (*LITTORINA* SP.)

A study was made during the year of the commercial aspects of the capture and marketing of periwinkles. Information obtained by the Division's agents indicates that periwinkles are rather abundant in New England and that a small quantity is shipped from Maine each year to wholesale markets in Boston and New York. They are packed for shipment in the shell with seaweed and ice in either boxes or barrels. Quantities of periwinkles also are taken in Rhode Island and are used there largely for bait, both in commercial and sport fishing, although some quantities are shipped from Rhode Island to the New York market. Shipments also arrive in Boston regularly by steamer from Nova Scotia. It is understood that the meat of this form is somewhat similar to that of the hard clam. A customary way of preparing it for food is by boiling in the shell, and the broth resulting therefrom constitutes the edible product which is most popular among people of Italian descent.

STATISTICAL INVESTIGATIONS

Fishery statistics are collected by the Bureau to serve two principal purposes—biological and economic. For this reason the Bureau must plan its statistical surveys to obtain comprehensive data for furnishing a complete and reliable picture of the condition and trend of the fisheries. The collection and compilation of the great mass of data necessary involves many problems. The fisheries are broad in scope, including over 160 varieties of aquatic products which enter into commercial production. These, many of which are migratory, are taken by a great variety of types of gear in areas along our seacoast and in our interior lakes and streams. If the biological aspect is to be served, complete annual statistics are needed on each of these phases in every section. If the economic aspect is to be served, statistics are needed not only on the phases listed above relative to the biological aspect, but also on the price structure, the processing function, and on marketing and distributing.

Statistics on these latter phases of the industry should be collected and published as soon as possible after the close of the business transactions in order to be of maximum value to the industry and others interested in the fisheries. However, because of limited funds and personnel it has not been possible to collect and publish these figures as currently as desired. For the same reason it has not been possible to collect statistics on the fisheries of the entire United States on an annual basis.

BIOLOGICAL ASPECT

The biologial aspect must consider two problems—the conservation and sustained supply of the resource, and the prediction of future trends or yields. Since the fisheries are usually prosecuted in areas not under private ownership, the problem of the conservation of these fisheries is of national concern. It, therefore, is important that close watch be kept of the condition of the various fisheries to detect depletion so that remedial measures can be promulgated timely and wisely. For this reason it is imperative that current statistical data be obtained on the yield of our fisheries.

These statistics then furnish the biologist with the background upon which to base his prediction of future trends and yields. This he does by coupling the statistical data with studies of the life history of the species. Difficulty is experienced in making these predictions because the supply (or population) of the species cannot be seen, as is the case with farm animals or crops. The more complete and more reliable the statistics on yield are, the better foundation the biologist has for conducting his studies. The Bureau, therefore, aims to obtain a complete picture of each individual fishery to further these biological studies.

ECONOMIC ASPECT

When the fishery has been conserved, and trends and yields of the fishery have been predicted, the problem still remains of supplying the fishery trade with the information so essential to the conduct of its business activities. In these days of increased competition the very existence of the fishery industry must depend upon reliable economic and statistical information. Such material has been especially valuable during the past few years, when it has been used

in national planning. The Bureau, therefore, aims to make its statistical surveys so complete that the industry and the various governmental organizations may turn to it for reliable fishery statistics.

SURVEYS CONDUCTED

The statistical surveys during 1937 were conducted under the immediate supervision of Edward A. Power, assistant statistician, and the general direction of Fred F. Johnson, Assistant Chief of the Division. These surveys included the collection and dissemination of statistics of the commercial catch and its value, operating units, and employment in the fisheries. In addition, data were collected on employment and compensation of those engaged in the fisheries as well as products of fishery wholesale and manufacturing establishments.

As previously mentioned, limited funds made it impossible to cover all the fishing areas of the country during the past year for 1936. However, the following areas were surveyed: Chesapeake States, South Atlantic and Gulf States, Pacific Coast States, and Lake States. Statistics of the fisheries of Alaska also were collected by the Alaska Division of the Bureau. Summaries of the production in those sections which were not surveyed during the year are included for the most recent years available in part 2 of this report.

In addition to the above, statistics were collected on the following special phases: The landings of fish by American fishing vessels at the ports of Boston and Gloucester, Mass., Portland, Maine, and Seattle, Wash. (published monthly); catch of mackerel in the North Atlantic fishery; cold-storage holdings of frozen and cured fish and amount of fish frozen, which are furnished by the Bureau of Agricultural Economics (published monthly); production, consumption, and holdings of marine-animal oils of the United States and Alaska (published quarterly by the Bureau of the Census); production of canned fishery products and byproducts of the United States and Alaska; transactions on the sponge exchange at Tarpon Springs, Fla.; volume of fishery products handled at the Municipal Fish Wharf and Market, Washington, D. C.; and the volume of the United States foreign trade in fishery products, furnished by the Bureau of Foreign and Domestic Commerce.

The following statistical and marketing agents assisted in the collection and compilation of the statistical data: S. C. Denham, F. F. Dimick, W. H. Dumont, R. L. Greer, Wm. Hagen, Jr., V. E. Heffelfinger, H. J. Kumin, B. E. Lindgren, C. J. Robbins, V. J. Samson, C. B. Tendick, and J. L. Whitcomb.

The reader is especially referred to the section in the latter part of this report entitled "Statistical Survey Procedure," which gives in detail the methods employed in the collection of fishery statistics and other pertinent information.

FISHERY MARKET NEWS SERVICE

It is history that seasonal gluts and famines of fishery commodities in our markets have frequently resulted in disastrous financial losses to the fishery industries and much economic waste to the nation. Likewise, experience has shown that such conditions have been largely the result of inadequate market information available to producers, middlemen, and other interested parties. If there is to be economy

in marketing transactions, buyers must know where they can purchase supplies of fish most economically and producers must be able to sell to their best advantage. As a means of developing the more orderly and economic marketing of fishery commodities, the Seventy-fifth Congress provided funds for the establishment in the Bureau of Fisheries of a market news service for the commercial fisheries.

Essentially, this new service constitutes an exchange of market information between the fishermen or producers in fishing areas and the middlemen in terminal markets, with the Bureau of Fisheries acting as the service agency; that is, the agency for collecting and disseminating the news.

This new work was inaugurated during the year under the immediate supervision of Andrew W. Anderson, marketing specialist, and the general direction of Fred F. Johnson, Assistant Chief of the Division. The early part of the fiscal year was devoted to exhaustive studies of methods used by other agencies in their administration of market news services and of conditions inherent in the fishery industry which might tend to influence the types of services having greatest application and value.

New York City was chosen for the first fisheries market news office due to its importance as a terminal market and consuming center for fishery commodities from virtually every State wherein a commercial fishery is prosecuted. It also is an outstanding port of entry and terminal market for similar commodities from the maritime countries of the world. The annual consumption of fresh and frozen fish and shellfish in the New York metropolitan area is estimated at 400 million pounds, or about one-third of the total consumption of such commodities in the United States. Consequently, it was evident that current information on supply, demand, and prices in this market was of paramount value to the efficient conduct of the industry everywhere.

In November 1937 the market news staff proceeded to New York City and concentrated its attention on the development of the service there. The first daily report was published on February 14, 1938. This report, which is released in mimeographed form each day except Sunday and holidays, includes the following data covering the daily activities on the New York market: Volume of arrivals of fishery commodities by all types of carriers, separately enumerated by commodity classification and State, Province, or country of origin, with separate statements of the arrivals by express, rail freight, fishing craft, coastwise vessels, and transoceanic steamships; prices in both the salt-water and fresh-water markets; and movements of fish and shellfish into and out of cold storage. It further includes information on landings and prices at other ports where agents of the Bureau are stationed, such as Portland, Maine; Boston, Gloucester, Provincetown, and New Bedford, Mass.; and Seattle, Wash. Data received by telegram from the Seattle agent relating to landings of halibut at Prince Rupert, B. C., also are included. William H. Dumont, fisheries statistical and marketing agent, is in charge of the New York market news office.

Due to the outstanding importance of Boston as a producing port for fishery commodities, it was chosen for the second market news reporting office and the establishment of the service was started there early in 1938. The preliminary work in Boston was quickly com-

pleted and daily reports were issued beginning on May 26. The service at Boston is very similar to that in New York City. Detailed data are included in the daily reports on the landings of fish and shellfish at the Boston Fish Pier. These figures are separately enumerated by types of craft, fishing areas, and species. As in New York City, data also are included in these daily releases on prices, cold-storage movements, and arrivals at Boston by express, rail freight, fishing craft, and coastwise as well as transoceanic steamships. Data also are included on the landings and prices at other New England ports, at New York City, and at West coast ports. The Boston service further includes advance reports on certain fishery commodities en route to Boston, such as vessels with fares of mackerel passing through Cape Cod Canal, fish shipped by transporting vessels from Canadian ports, and express shipments clearing certain towns on the United-States-Canadian border in Maine. B. E. Lindgren, fisheries statistical and marketing agent, is in charge of the fishery market news service in Boston.

Studies are now in progress preliminary to the establishment of a market news reporting office in Seattle, Wash., and other offices will be established as time and facilities permit. Agents also will be stationed at other producing points to submit current market news data to the reporting offices.

The popularity of the fisheries market news service with members of the fishery industry and others has been demonstrated by the many commendatory letters received by the Bureau about the work from fishery associations, wholesale fish dealers, cold-storage and freezing companies, transportation agencies, financing companies, Federal, State and Canadian fishery agencies, fishermen, and reporters and editors of newspapers and periodicals.

It will be the Division's aim to continue a sound market news service and to incorporate in this service as much useful current data from important producing and consuming centers as can be accurately collected with available facilities. Furthermore, every effort will be exerted toward speed in dissemination.

COOPERATIVE MARKETING

The work of the cooperative marketing unit of the Division, which is charged with handling matters relative to the administration of Public, No. 464, an act passed by the Seventy-third Congress, second session, authorizing associations of producers of aquatic products, was continued during the year under the direction of L. C. Salter, fishery economist.

Since its establishment in 1935, the cooperative marketing unit has been conducting investigations to determine as far as possible the cooperative status of fishery organizations in the United States and the nature and extent of their activities and has given personal assistance to groups of fishermen contemplating the formation of cooperative associations. As part of this program, a survey of fishery associations on the Pacific coast was begun in 1936. During 1937 this was extended to include the fishing areas of the Atlantic and Gulf Coast States. Along with this survey, as a companion study, the unit has continued its investigation relating to the financing of fishing enterprises throughout the major fish-producing areas of the country.

It has been found that, among fishermen and associations visited, there is widespread interest in the possibilities of advancing cooperative marketing activities. This interest has been evidenced further by many requests for the Bureau to give aid of an advisory character concerning operations and management, and financing problems. Wherever possible, such assistance has been supplied through correspondence, informative literature, or personal contact.

During the past year a form letter was sent to State marketing agencies of commercial fish-producing States, to learn the extent to which these agencies were engaged in fishery cooperative marketing work. Replies revealed that very little work of this nature was being done. It was indicated in some instances, however, that the organic law or subsequent acts of State legislatures provide that State marketing agencies might conduct work of this character, but that the lack of it in many cases had been due to failure of fishermen and their associations to request this type of assistance. Statements were made to the effect that if fishermen or their associations desired such assistance and suitable appropriations were made by the State, work in behalf of fishery cooperative marketing could be conducted readily.

At the request of the Director of the Extension Department of St. Francis Xavier University, Antigonish, Nova Scotia, the Bureau's cooperative marketing specialist attended the Fifteenth Annual Rural and Industrial Conference held at the university in August 1937 and delivered an address on fishery cooperative marketing in the United States. This conference was devoted to the discussion of social and economic phases of rural and industrial life of the Province of Nova Scotia, in which fishermen and fishery cooperative associations have played an important part. Following the conference, the Bureau's representative was given an excellent opportunity to study cooperative activity among the fisher-folk of Nova Scotia, and the adult education and extension work of the university in connection with its efforts to teach fishermen the principles of cooperative marketing and to help them organize and operate cooperative associations. At a specially arranged meeting, attended by the Bureau's representative, details of the history and development of the cooperative work in Nova Scotia were discussed, as well as present cooperative marketing activities and progress being made. At the close of the conference, arrangements were made for a group of the conference members to visit various fishing communities in Nova Scotia in which one or more cooperative projects were being conducted.

As a result of the address on fishery cooperative marketing in the United States delivered at St. Francis Xavier University, Rev. E. A. Kerr of St. Michael's Parish, Ridge, Md., who attended the Annual Rural and Industrial Conference, requested the Bureau's assistance in connection with proposed cooperative activities contemplated by a group of pound-net and oyster fishermen of his parish. In compliance with this request, three representatives of the Bureau attended a meeting of the fishermen at Ridge, on October 14, 1937, for the purpose of discussing with them plans which they had been considering for the organization of an association for the cooperative marketing of their fishery products. Our representatives outlined the work of the Bureau relating to fishery cooperative marketing activities; discussed the principles, functions, and operations of fishery cooperative associations; and offered advice and suggestions to enable this group of

fishermen to become thoroughly familiar with the functions of cooperation before attempting to solve their local problems by this method. Later, one of the Bureau's technologists assisted the group in solving certain fishery processing problems.

Direct assistance also was given to a group of fishermen requesting assistance in the formation of a cooperative plan for the selling of shrimp at Thunderbolt, Ga. The Bureau's cooperative marketing specialist met with the group and later drew up a working agreement enabling these fishermen to operate cooperatively to sell their shrimp in an unincorporated manner until such time as sufficient funds would become available to properly organize and operate a cooperative marketing association.

At the meeting of members of the fishing industry at Atlantic City, N. J., in February 1937, members of the Bureau led a round-table discussion in which the work of the Bureau pertaining to fishery cooperative marketing was explained. Information also was supplied regarding what had been done among fishermen themselves in the United States in the way of cooperative activity.

Aid and assistance also was given to the Southern New England Fishermen's Association, Mystic, Conn., in June 1937, as to methods for improving markets for fishery produce.

In order to correlate the Bureau's cooperative marketing work with that of other agencies, our cooperative marketing specialist attended the meeting of the American Institute of Cooperation, at Ames, Iowa, in June, where he participated in round-table conferences concerning cooperative marketing and purchasing. Considerable interest was shown by this group in the work of the Bureau relative to the cooperative marketing of fishery products and mutual plans were developed for current exchange of information on cooperative enterprise.

While in Iowa, our cooperative marketing specialist conferred with representatives of the Iowa Conservation Department at their request, concerning the possibility of developing a plan for the cooperative marketing of carp and buffalofish taken in Iowa and adjoining States. These fishes are not highly prized in these States and, in an effort to rid their waters of them, the States have various contractual arrangements with the commercial fishermen. It was believed that if some type of cooperative marketing arrangement could be developed among those States that greater revenue could be derived from the sale of these fish.

In the spring of 1937 two bills (H. R. 6039 and H. R. 7309) were introduced into the United States House of Representatives, by Congressman S. O. Bland of Virginia, proposing the establishment of a fishery credit corporation for lending funds to fishermen's associations organized and operated in accordance with Public, No. 464, mentioned previously, and for the establishment of administrative agencies in connection therewith. Hearings on these bills were held on June 29 and July 16, 1937, before the Committee on Merchant Marine and Fisheries of the House of Representatives but at this writing the Congress has not yet acted on these bills.

The proceedings of these hearings have been published under the title "Fishery Credit Act, Hearings before the Committee on Merchant Marine and Fisheries, House of Representatives, Seventy-fifth Congress, First Session, on H. R. 6039 and H. R. 7309."

On December 31, 1937, Mr. Salter resigned from the Bureau to accept employment as a cooperative specialist with the Tennessee Valley Authority, Knoxville, Tenn.

TECHNOLOGICAL INVESTIGATIONS

Improvement of quality and increase in economic value of the products of our fishery industries constitute the goal toward which our technological investigations are directed and are constantly striving. The most modern tools of the various applied sciences are used in accomplishing these practical ends. This is conservation of a natural resource in its broadest and most effective meaning. For instance, it is comparable to the efforts of agricultural science in aiding farmers to make the most complete and valuable use of corn and cornstalks. In recent years much has been heard of a movement among scientists, known as the farm chemurgic. In a practical sense, this means teaching the farmer to direct the surplus products of his land, after food requirements have been met, to the factory as a source of supply of raw materials in the manufacture of industrial or nonfood products. In other words, the purpose of this movement is to bring agriculture and industry closer together and to make the farm a source for industrial raw materials. Likewise, fishery technology is serving not only to make more types of food available from the sea, but also is serving as the "sea chemurgic" to the "fishers of the sea," in teaching them to make valuable industrial commodities from fishery products, after primary food requirements have been met.

While our fishery technological studies have been of great value to the domestic fishery industries in increasing productive capacity and creating new wealth for the American people, their value to our domestic economy does not end there, for other American industries also are making great use of the results of our technological work. Many of these latter industries are consumers of raw materials produced by American fisheries and they follow our investigations very closely. At times, some have sent their technicians to our field and Washington laboratories where they have conferred with our technologists to keep abreast of the latest research developments. Following these contacts, some of these industries have applied the results of our researches to the manufacture of their products.

For instance, in 1919, the Bureau of Fisheries pioneered in the development in this country of quick-freezing methods in the preservation of a food product and has continued researches in the frozen food field ever since. Other food industries have been quick to grasp the significance of this work and now the quick-freezing of fruits, vegetables, and meats has become one of our major industries.

In another instance, the Bureau pioneered in searches for new sources of vitamins A and D and found that the oil from the livers of many species of fish are potent in these vitamins. Heretofore, only the livers of cod were thought to be useful for this purpose. The drug industry took advantage of this work and now produces many thousands of gallons of oil high in vitamins A and D from fish livers and fish viscera which formerly were discarded by the fishermen at sea. Likewise, our researches on the value of fish meal for feeding domestic animals have been of great value to the feed industry of this country.

A few years ago, the Division's technologists developed a smokehouse for curing fish which automatically controlled the temperature, humidity, and volume of smoke. In semicommercial operation, this produced a product which had a pleasing appearance and taste and one which was a considerable improvement over the usual smoked fish product prepared by "rule-of-thumb" methods. Many members of the fishery industry made use of this work and are now producing a better smoked fish product than heretofore. It has recently come to the attention of the Bureau that the results of this work are also being applied to the commercial smoking of meat products by the meat packing industry.

Our technologists are now conducting a cooperative investigation with a company interested in the temporary chemical preservation of fishery products until they can be concentrated at a central point for conversion into useful byproducts. The results of this work have been applied commercially to the preservation of various types of fish and fish products. In addition, the renderers of byproducts of the meat industry have taken advantage of this development to their economic benefit.

Several years ago, researches of the Bureau revealed that fishery products as a class are higher in iodine than most foods from land sources. As is well known, iodine is a mineral essential in the diet of man and animals. The fishery industry made considerable use of this knowledge attained by the Bureau to promote the increased consumption of aquatic foods. In addition, the salt industry utilized the scientific facts and now markets a product known as iodized table salt which is the usual salt to which a small amount of iodine has been added.

LABORATORIES

During 1937, the Division carried on its technological studies under the direction of Dr. J. R. Manning, senior technologist, at its laboratories located in Washington, D. C., College Park, Md., and Seattle, Wash. In addition, certain cooperative investigations were conducted by members of our technological staff in the laboratories of the University of Maryland, and Maryland State Agricultural Experiment Station at College Park, Md.; the University of Washington, Seattle, Wash.; and Washington State College, Pullman, Wash.

Construction of the small technological laboratory building in Seattle, Wash., referred to in last year's report, was completed. Heat, light, power, and plumbing facilities were installed and a greater portion of the Bureau's experimental equipment was set up in readiness for operation. Actual experimental work was undertaken shortly after January 1, 1938.

The building was designed to provide facilities for setting up experimental machinery and equipment necessary in investigating methods for preserving and utilizing fishery products. It is of frame construction, 26 feet wide and 40 feet long. The walls of wood are 11 feet high and are planned for future brick veneer. The concrete floor slopes to a center drain. The standard equipment includes a 10-horsepower, high-pressure, oil-fired steam boiler, a steam-jacketed dryer, vacuum pump and condenser, an hydraulic press, a filter press, three centrifugal separators, a hammer mill, an attrition mill,

an iron mill, a Wiley mill, a bone cutter, a refrigeration machine and cold storage cabinet, and miscellaneous jacketed cooking kettles. These are further supplemented by recording instruments and miscellaneous experimental equipment developed in the course of investigative work. The laboratory has both hot and cold water, a large wash sink, complete lavatory fixtures, and will be heated by an extended surface steam heater. All motive power is by electric motor, either direct or by line shaft, and adequate light, power, water, and gas outlets are provided around the laboratory. This building is a valuable addition to the Bureau's facilities for carrying on technological investigations and will permit semicommercial work heretofore impossible at the Seattle laboratory.

During 1937 our technological investigations in general were delayed or suffered from lack of suitable and sufficient space. Particularly was this true at our technological laboratories at College Park, Md.

PRESERVATION OF FISHERY PRODUCTS FOR FOOD

Studies during 1937 in the preservation of fishery products for food were conducted in the Bureau's technological laboratories at College Park, Md., Washington, D. C., and Seattle, Wash. The investigations in the College Park Laboratory were carried on under the supervision of James M. Lemon, technologist in charge, assisted by W. T. Conn, assistant technologist; S. R. Pottinger, junior technologist; M. E. Stansby, junior chemist; Joseph F. Puncochar, junior bacteriologist; William B. Lanham, Jr., junior chemist; Willis H. Baldwin, Hillman C. Harris, L. F. Ortenzio and C. E. Swift, research associates and student assistants; in the Seattle laboratory under the supervision of Roger W. Harrison, technologist in charge, assisted by Robert E. Silver, junior chemist; Charles Butler, William Clegg, Louis Simenson, Marie Sater, and Rhea Waterberry, chemists, assigned to our laboratory by the Works Progress Administration; and Leslie Lowen, Neil Nellis, and Robert Rucker, research associates and student assistants; and in the Washington laboratory by Norman D. Jarvis, assistant technologist in charge of experimental canning investigations, and Agnes I. Webster, fish cookery expert.

ELECTROMETRIC TESTS FOR DETERMINING THE FRESHNESS OF FISH

Several years ago an electrometric method or test for determining the relative freshness or degree of quality of fresh haddock was developed by M. E. Stansby and J. M. Lemon of our technological staff. During the ensuing years these men have been engaged in perfecting this method and in extending its application to the determination of the quality of fresh cod and pollock. In the meantime, as stated in the 1936 Division report, considerable interest was aroused by the industry in the possible commercial application of this test. In the original development of the method, the apparatus was designed for the testing of not more than four samples, simultaneously. This was one of the difficulties which was encountered when attempts were made by one of the large fishery producers in 1936 to use the test in commercial practice. At the request of this firm, and with its cooperation, the Bureau detailed M. E. Stansby to work with technologists of the

firm for the purpose of designing an apparatus which could be used commercially and which would enable an operator to make a greater number of tests simultaneously. Mr. Stansby was engaged in this cooperative detail from July 15, 1937, until the end of the year and, as a result of this work, designed equipment which can make determinations upon 10 samples of fish at one time. Thus, it is possible for the firm to make very rapid tests for the freshness of fish purchased, by means of this new apparatus, without delaying their packing activities. Ordinarily, 15 to 30 minutes were required for testing one sample. However, with the new apparatus, it is now possible for the operator to run the 10 samples in the same length of time and the test is now rapid enough to be used in the ordinary commercial control laboratory. The design of the apparatus is also quite simple and it is easy to manipulate. After a little practice an operator, without advanced scientific training, can obtain excellent results. At the present time this equipment is being used by the firm, in whose laboratories it was developed on a commercial basis, for the selection of fish which are to be used in packs of frozen products.

STUDIES OF RANCIDITY IN FISH

For the past several years we have studied the causes of rancidity in various fishery products and have worked on methods for its prevention which might have promise of commercial application. This work has been done in cooperation with the Musher Foundation, Inc., New York City, by research associates employed by the Foundation and stationed in our laboratories both at College Park, Md., and Seattle, Wash.

Several phases of this work which were conducted at our laboratories at College Park and which were described in last year's report, were completed and the results published in the following reports: "Oat Flour as an Anti-oxidant in the Salt Mackerel Industry," by J. M. Lemon, M. E. Stansby, and C. E. Swift, Food, vol. 6, No. 71, pages 441–443, August 1937, 33 Tothill St., Westminster, London, S. W. 1, and Food Industries, vol. 9, No. 10, October 1937, McGraw Hill Publishing Co., New York, N. Y.

Other phases of this work were conducted in our Seattle laboratory where studies were made by the research associate of the Foundation of the effectiveness of cereal flours and cereal flour extracts in preventing the development of rancidity and the destruction of vitamin A in fish oils and fish liver oils, and the usefulness of these materials in preventing deterioration in other preserved fishery products. As a result of this work, it was found that cereal flours and their extracts have a mild antioxidant action on these products. In the case of fish oils and fish liver oils the effect was due to retarding the rate of oxidation rather than preventing it for any extended period. In the case of the vitamin active oils, vitamin A destruction corresponded with autocatalytic oxidation; therefore, the cereal flours did not materially increase the period before destruction began but decreased the rate of destruction. On the basis of organoleptic examination, treated oils appeared to be less rancid than untreated oils with a similar degree of oxidation as shown by the peroxide test.

When cereal flours were dusted on dressed salmon or sardines just prior to canning, or the extracts were sprayed on the fish or in the can,

the canned products in general had a less pronounced odor and flavor during early storage but the advantage seemed to disappear soon.

The addition of cereal flours to brine used in the preparation of mild cured and kippered salmon did not show any detectable improvement in the quality of the product. On the other hand, canned Maine sardines prepared from fish treated with salt and oat flour in the hold of the boat during transit to the cannery showed some improvement over those to which salt alone had been added.

Spraying cereal extract on the surface of spiced herring resulted in the treated samples having a definitely better odor and flavor than the untreated samples after extended storage.

Studies on these and other aspects of the possible utility of the cereal flours is being continued by the research associates of the Musher Foundation.

STUDIES OF LACTIC ACID AS A POSSIBLE INDEX OF DECOMPOSITION IN FROZEN FISH

In order to simplify understanding of the problem, decomposition of fish might be classified into three general types. These are: (1) Enzymatic decomposition, or the action of enzymes, already present in the fish when alive, and which begin to break down the more complex compounds in the fish into simpler substances; (2) the deterioration or oxidation of the oil in the fish; and (3) bacterial decomposition.

When fish are frozen the bacterial action is arrested, since the bacteria are almost entirely killed at freezing temperatures. However, the other two types of decomposition in fish proceed but at a much slower rate than if the fish were not frozen nor held at low temperatures. The problem of rancidity or oxidation in fish is discussed elsewhere in this report. Therefore, we are concerned here with enzymatic decomposition. It is known that one of the indications of the action of enzymes in fish, immediately after death, is an increase in the formation of lactic acid. Since lactic acid is a definite chemical compound and its quantities in fish can be accurately determined by analysis, our technologists decided that the amounts of lactic acid formed in fish at various stages of decomposition might be used as a reliable index of the progress, rate, or stage of decomposition or, to put it another way, it might be an accurate means of measuring the relative freshness of fish, somewhat similar to the use of the electrometric method for determining the relative freshness of fish, discussed elsewhere in this report.

Therefore, during the summer of 1937, Willis H. Baldwin, graduate student assistant, was temporarily assigned to duty at the Maryland State Marine Biological Station at Solomons Island, Md., for the purpose of procuring and freezing samples of fish to be used in a study of this project. It was necessary for the investigator to obtain these fish himself so that he would have a complete history and control of the fish from the time they were taken from the water until they had passed through the progressive stages of chemical changes accompanying decomposition to a point where they would be no longer fit for use as food. In some instances, fish were actually taken from the water alive and killed or were frozen, while alive, and the amounts of lactic acid determined in each sample immediately after freezing. These samples were then brought to our technological laboratory at College

Park where they were stored in a low temperature refrigerator and analyzed for lactic acid content at regular intervals during the entire period of storage.

Since this work was not begun until late in 1937, we are not in a position to report any definite conclusions at this time. However, it was found that fish which were frozen alive, and others which were frozen in rigor, had a lower lactic acid content after storage of 4 months than fish packed fresh in ice for 3 days, but still in rigor and then frozen and held in storage for 4 months. Still higher percentages of lactic acid were shown in fish, not kept in ice, but frozen 3 days after death and on which determinations were made after 4 months of storage. It is possible that this study may not only yield another reliable index of decomposition but it may also reveal data which might enable our technologists to develop means of preventing or arresting enzymatic decomposition in fish.

IDENTIFICATION OF CANNED SALMON

The utility of a test for identifying canned salmon according to species was discussed in last year's report, and certain data were given which suggested the possibility of identification on the basis of the refractive index and color of the free oil in the can. During the past year our technologists examined oil samples from approximately 1,000 cans of salmon which were selected as representative of the 1936 season's pack, and found that there was considerable overlapping of the refractive index and color of the oil between the species. This, therefore, precludes the use of this test as an infallible means of identifying canned salmon.

CHANGES IN THE COMPOSITION OF PINK SALMON (*Oncorhynchus gorbuscha*)

In 1936 the Bureau published Investigational Report No. 33 entitled, "Physical and Chemical Changes in the Pink Salmon During the Spawning Migration," by Frederick A. Davidson, Division of Scientific Inquiry of the Bureau, and O. Eugene Shostrom, National Canners Association, Seattle, Wash. Since the pink salmon is one of our most important species of food fish, used almost entirely for canning, our Seattle technological laboratory at the beginning of the salmon season in 1937, and with the assistance of chemically trained personnel supplied by the Works Progress Administration, undertook a further study of individual fish of each sex as to gross composition, such as percentage of fat, ash, protein, moisture, water soluble nitrogen compounds, heat coagulable nitrogen compounds, free amino nitrogen, copper precipitable nitrogen, and phosphotungstic acid precipitable nitrogen. These analyses for gross composition indicate that while the fat content decreases and moisture content increases, during the course of the spawning season, there is very little if any apparent change in the composition or nature of the protein until the fish reach fresh water. In addition, purified protein material was prepared from the samples and reserved for subsequent quantitative measurement of certain essential amino acids.

CANNING AQUATIC PRODUCTS

During 1937 the series of experimental packs in the study of home canning methods was completed, and packs previously prepared were examined to gather data for a final report on improved methods for home or noncommercial canning. Data obtained during the year indicated that such fresh-water varieties as the carp, hitherto regarded as unsuitable for canning, could be prepared as a canned product of good quality, by home or noncommercial canners, thereby opening the door for wider utilization and conservation of fishery resources in the interior of the country, as well as increasing and diversifying the supply of food for home consumption.

Studies on the development of a commercial method for canning the blue crab of the Atlantic and Gulf coasts were continued with series of experimental packs of crab creole, crab gumbo, crab soup (Norfolk style), crab cakes, and crab sandwich paste.

In addition, many experiments were made to prevent discoloration of crab meat packed without other food ingredients. Considerable progress has been made toward the solution of this latter problem, as packs have been prepared which show no discoloration after six months of storage and have the color and flavor of fresh crab meat. The method is now being tested on a large commercial scale at various fish-canning plants along the Atlantic and Gulf coasts and the results of this work will be reported upon later.

In addition to the above mentioned products, further experimental packs prepared during 1937 have included fish chowder, clam chowder, scallops, whiting, California pilchard (sardine), Dungeness crab, Maine sardine, and herring (alewife) roe. The results are not yet available.

The survey of present and modern commercial methods for the canning of fish and seafoods was continued. Field work was carried out in the Chesapeake and New England areas. Data were gathered on commercial methods of canning alewives and alewife roe, finnan haddie, fish balls, fish cakes, fish flakes, Atlantic mackerel, sturgeon, shad, soft clams, mussels, crab, lobster, Maine sardines, pet food, clam chowder, fish chowder, fish roe, anchovies, smoked herring, spiced herring, smoked salmon, salmon caviar, and salmon bait eggs.

At the request of the State of Virginia, our technologist in charge of experimental canning was detailed to make a study of the herring roe canning industry in that State, with a view to improving methods, and to draw up tentative grades and regulations for a State voluntary inspection system of canned herring roe. As a result of this work, a State inspection system is being set up for this purpose adopting recommendations made in this study.

BACTERIOLOGICAL STUDIES

Our bacteriological investigations during the past year were carried on by Joseph F. Puncochar, junior bacteriologist; Harold E. Crowther, research associate; and Louis F. Ortenzio, graduate student assistant. Most of our bacteriological problems are closely integrated phases of specific problems or projects in the preservation of fishery products for food or the preservation of fishery byproducts, or closely coordinated studies of spoilage problems. Thus, bacteriological examinations are

made of the experimental packs of canned fishery products to determine which processes produced sterility; bacterial counts are made on samples used in our studies on the development of indices of relative freshness or of decomposition; the use of ultraviolet rays in killing bacteria; determinations of the value of various chemical preservatives in preventing or retarding bacterial spoilage in fishery byproducts; and other miscellaneous bacterial control problems.

STUDIES OF ULTRAVIOLET RAYS IN KILLING BACTERIA

Since the reduction of the presence of bacteria in fish is essential to the preservation of fish, any device or method which can be found to bring about this accomplishment is vitally important to the industry and to the consumer. According to information which we have received, resulting from studies made on other food products, the use of ultraviolet light rays has been beneficial in reducing bacteria in milk, meats, bread, etc., and in improving the keeping qualities of these foods. Therefore, late in 1937, our bacteriologists began a study of the effect of these ultraviolet rays in reducing the bacterial count of various fishery products. As a result, we have found that the rays will kill marine bacteria and we hope to work out a practical and commercially feasible application of this method in the treatment of fishery products.

STUDIES IN THE HANDLING OF FRESH OYSTERS

Late in 1937, at the request of the Oyster Institute of North America, and in cooperation with that organization, a program for studying the handling of fresh oysters was undertaken. Louis F. Ortenzio, a member of the Division's technological staff, was assigned to the study of this problem. While this problem has certain chemical aspects, the major portion of the investigation is a bacteriological one. The work has not progressed to a point where recommendations in the improved handling of oysters can be made.

Briefly, the following experimental procedure is being used. Bacterial counts to measure the rate of bacteriological decomposition and determinations of the pH to measure the rate of chemical decomposition are being made on commercial shipments of oysters. This may lead to the development of a test for determining the relative freshness of oysters as well as to the development of methods for preventing or retarding spoilage of fresh and frozen oysters.

PHARMACOLOGICAL STUDIES

The role of minerals in foods and in feedstuffs for farm animals is becoming of increasing importance. Not only have certain minerals been found to be essential in nutrition, but there is need for a better understanding of other physiological effects they may have on the animal organism. With this in mind, the Bureau has continued its studies on certain minerals, naturally occurring in fishery products.

THE FLUORINE CONTENT OF FISHERY PRODUCTS

The fluorine content of foods presents a major problem in nutrition since the discovery that fluorine is responsible for mottled enamel of teeth. Therefore, during 1937, our technological staff undertook a

study of the fluorine content of various fishery products and the effect of this fluorine, as it naturally occurs in some fishery products, in the metabolism of the animal organism. A series of so-called "balance" experiments were started, in our College Park laboratories, to determine the intake and excretion of fluorine in rats fed a diet of canned fish, containing about 8 parts per million of fluorine. Preliminary work on this problem indicates that there were no apparent toxic symptoms in the experimental animals after a test period of 12 weeks, and the consumption of fish was very statisfactory.

MANUFACTURE OF FISHERY BYPRODUCTS

The utilization of waste for the manufacture of byproducts is becoming of increasing importance, probably more so in the fishery industries, than in other food industries. It has been estimated that the value of fishery byproducts represents about 15 percent of the total value of all fishery products in the United States. When we study the diversification of these byproducts and their uses, they loom into even greater economic importance than their relative volume would seem to indicate. Fishery byproducts furnish raw materials or finished products for such highly important consuming industries as the drug, paint and varnish, soap, and feed industries. Accordingly, our technologists are giving increasing attention to the conversion of fish waste and other waste materials resulting from our fishery harvest into useful byproducts. During 1937, investigations dealing with the preservation of fishery byproducts were carried on in the Seattle technological laboratory under the supervision of Roger W. Harrison, technologist in charge, with the assistance of Andrew W. Anderson, assistant technologist (subsequently transferred to the market news service); Robert E. Silver, junior chemist; and Leslie Lowen, Neil Nellis, and Robert Rucker, research associates and student assistants; and in our College Park technological laboratory under the supervision of of James M. Lemon, technologist in charge, with the assistance of S. R. Pottinger, junior technologist; M. E. Stansby, junior chemist; Joseph F. Puncochar, junior bacteriologist; and Harold E. Crowther, R. H. Flowers, and C. E. Swift, research associates and student assistants.

UTILIZATION OF SALMON-CANNERY TRIMMINGS

In previous reports we have discussed the economic importance of the waste accumulated during the preparation of salmon for canning and the progress being made in the Bureau's studies on methods of utilization. During 1937, we had hoped to extend this work to pilot plant operations but due to unforeseen delays in getting the new technological laboratory building in Seattle, Wash., in readiness such studies were necessarily postponed and the investigation was confined to work permitted by the facilities of the chemical laboratories.

In view of this, a rather extensive survey was made on the chemical and physical properties of the oil obtainable from the various components of salmon waste and from the total waste of the five species of salmon from the principal fishing areas of this fish in the United States and Alaska. As indicated in our last report, it is possible to obtain oils having quite widely varying properties. The chemical studies on these samples were continued during the past year for the

purpose of obtaining further data on their composition. The studies included the estimation of the percentages of saturated and unsaturated fatty acids and their mean molecular weights. These data are being included with the former data in report form.

In certain localities in Alaska the problem of utilizing salmon cannery trimmings is primarily one of how to overcome the seemingly prohibitive situation of having a season of operation of not more than 30 days during the year. One means of accomplishing this would be to broaden the scope of operations to include other types of fish which are available over a longer period of time which would permit a byproducts plant to operate over a longer season. In this connection our technologists began studies on the utility of other fishery materials which might be available for supplementing the supply of salmon cannery waste. An examination of samples of atkafish, said to be abundant in the Bristol Bay area, indicated these fish would yield at least 30 gallons of oil per ton of raw material and the resultant meal would contain over 70 percent protein. Except for color, the properties of atkafish oil were quite similar to those for red salmon oil. Greater attention might also be given to the utility of these fish as a source of human food.

Since beginning our investigations on the utilization of salmon cannery waste, definite progress has been made by the salmon-canning industry toward more complete use of the waste. A certain degree of this progress can be attributed to the advisory service being supplied by the Bureau's technologists on the basis of their investigational work.

FISH-LIVER OIL STUDIES

Methods of extraction.—Because of the sustained interest in fish livers as sources of highly potent vitamin active oils, the Bureau has continued to give considerable attention to developing methods for the more economical extraction of oil from these livers.

In last year's report reference was made to the development of a simple method of oil extraction which had been demonstrated to be applicable to halibut and "lingcod" livers. This involved a special mechanical disintegration of the liver, conversion of the liver tissue into a soluble and nonheat coagulable condition, and separation of the oil from the solution by centrifuging. An application for a public service patent on the method is on file at the United States Patent Office.

During the past year the above method of extraction was found to give satisfactory results with swordfish livers but was not directly applicable with uniform success to domestic tuna livers. This is because the tuna livers are normally of very low oil content and the active lipolytic action in the liver during the period required to bring the catch to port results in there being only a very small quantity of neutral glyceride oil available for recovery. This difficulty, however, can be overcome by mixing a quantity of foreign oil with the livers prior to subjecting them to the extraction process. Experiments on salmon livers and salmon waste during 1933 had demonstrated the vitamin solvent action of fish oil and the experiments on tuna livers during the past year demonstrated the increased efficiency when using the foreign oil in connection with the process developed for halibut livers. The method is applicable for producing oils

approaching the normal concentration of the oil in the liver or it may be used in fortifying the foreign oil to any desired degree below this potency.

Vitamin testing methods.—For a number of years the antimony trichloride color reaction has been a popular method for estimating the vitamin A potency of fish-liver oils and finds usage as a control test. However, the method has been subjected to such a great amount of criticism that many investigators consider the test to carry no degree of reliability. In spite of this criticism, there are others who have found the method useful and continue to use it, taking cognizance of its reported limitations. One of the principal criticisms of the method is that there is no consistent relationship between Blue value (colorimetric method) and Biological value as determined with rats. In this case, however, the data are generally viewed from the standpoint of a direct comparison.

During the course of our liver oil studies, Blue unit values have been obtained on a relatively large number of liver oil samples having vitamin A potencies varying between 5,000 and 200,000 U. S. P. units per gram as determined by biological assay. In studying these data, there was found to be a definite power relationship between the two types of values. In applying this correction it has been possible to increase the accuracy of the test.

FISH OILS IN PAINTS

During the past year, as a result of conferences of our technologists with members of the industry, there was a greatly increased use of fish oils in paints. Not only did this increase extend to the lower grades of paints, but, for the first time in the history of the paint industry, some of the leading paint manufacturers made extensive use of fish oils as ingredients of the higher priced paints and this fact was widely advertised in trade journals. This development can be attributed largely to improvements in the refining of fish oils by some of the leading refiners of the country, with the cooperation and assistance of our technologists.

STUDIES ON FAT IN FISH MEAL

As fish meals have become more widely used and their properties more thoroughly understood, the question of fat content has likewise become an important consideration. The reason for this is that the amount of fat present is an indication of the proportion of the material which may be subject to oxidative deterioration. Consequently, low fat content meals are preferred by some consumers and sale may be predicated upon this factor. Unfortunately, however, the fat, or more correctly the oil, becomes less soluble in normal solvents when oxidized, and oxidation may, therefore, lead to an apparent decrease in fat content. Furthermore, accepted practice for determining fat is not uniform. The unsatisfactory nature of this situation is obvious because a meal reported as having a low solvent extract value may have reached this condition as a result of oxidative deterioration.

For some time the Bureau has appreciated the need for tests which will clarify this confusing condition, because such information would not only lead to more satisfactory methods of control in marketing

fish meal but would also provide useful means in furthering study of changes taking place during storage and the effectiveness of improved storage practice.

During the past year attention has been given to determining the relative amounts of extractable material removed by different solvents from fish meal soon after being prepared and after extended storage under conditions known to lead to oxidative deterioration. Sixteen solvents were tested on two separate types of fish meal. The most significant aspect of the data secured on these tests illustrated the widely differing effectiveness of individual solvents and the fact that effectiveness is closely related to chemical structure. This will materially facilitate the work contemplated during the ensuing year.

In addition to the studies mentioned above, which were conducted in the Seattle laboratory, the Bureau's nutrition laboratory at College Park, Md., has been studying the physiological effect of the development of rancidity or oxidative deterioration in the fat of various fish meals, and other chemical changes, in the feeding of both white rats and baby chicks, as laboratory animals. This latter investigation particularly emphasizes the effect on these animals of any physiological and chemical changes which may be induced under varying conditions of manufacture, handling, and storage, which may cause the development of rancidity of the fat or the partial digestion of the protein in these fish meals. These studies have not progressed to a point where any conclusions can be reported.

CHEMICAL PRESERVATION OF FISH AND FISH WASTE

Several years ago the Bureau established a cooperative arrangement with the Aquacide Co., Washington, D. C., for the conduct in the Bureau's College Park technological laboratories of a study of methods of chemical preservation of fish and fish waste. At many points in the United States and in Alaska there are relatively small accumulations of fish waste or waste fish, not sufficient to justify the installation of machinery or mechanical equipment for the production of byproducts, but sufficiently large to merit the development of cheaper methods of utilization. The problem has been attacked from two standpoints. One is the temporary chemical preservation of the waste until it can be transported to some central point for more complete mechanical reduction and the other is outright chemical preservation or reduction for use as fertilizer stock, etc.

As in 1935 and 1936, the Aquacide Co., during 1937, employed and stationed in our laboratories Harold E. Crowther, R. H. Flowers and C. E. Swift, research associates. Already, results of considerable practical value have evolved from this program of cooperative research. A chemical solution developed by the above company has been tested on various types of fishery waste and has been shown to be very effective in its preservative qualities. In recent years its effectiveness has been improved by numerous tests on fishery waste. One very important commercial possibility, as a result of this work, is the temporary chemical preservation of cod livers and other fish livers at sea until these livers can be transported to a central plant for the extraction of the oil. The widespread application of this method has promise of saving from spoilage many fish livers which now do not reach the plant quickly enough for the extraction of an oil of good

quality. At the present time only a relatively small part of the catch of haddock and cod is made close to shore, and for this reason the method may find use as a temporary means of preservation for the livers yielded by the fisheries for these species.

During 1937 one of the research associates working on the chemical preservation of fish waste was stationed at Boston, Mass., to direct the handling and preservation of fish livers at sea. Under his direction many types of chemical preservatives were tested under practical conditions. The preservative solutions were sent to sea on fishing vessels and fresh livers were placed in these solutions by the fishermen. The livers were then shipped to the Bureau's College Park laboratories, where they were inspected, rendered, and the relative quality of the oils determined. By these experiments there was developed a very effective preservative chemical solution which stopped bacterial and enzymatic decomposition and kept the oils in their original fresh condition. However, rendering methods in ordinary commercial use were not easily adapted to these preserved livers. Therefore, a new "flotation" process was developed which results in high yields of oil, oils of high quality, and economy of operation. The details for large scale application for these preservative and rendering processes are now worked out on a semicommercial basis and the commercial usefulness of the work seems assured.

As a part of this cooperative program our nutrition laboratory is making an extensive study of the vitamin A and D content of the various organs of the viscera of cod, cusk, hake, halibut, haddock, pollock, and other species preserved with the chemical formulas.

NUTRITIVE VALUE OF AQUATIC PRODUCTS

There is a great need for more complete information concerning the food value of various commercially important fishery products. There is also considerable demand for this information, not only from the industry, but from the consuming public. There are notable gaps in this information because scientific studies have not covered all of these fishery products, and there is only partial knowledge of the nutritional properties of some of the others. The lack of this information hinders dietitians and home economics experts in determining the most satisfactory use of fishery products in the diet. The food and drug industries need, and have requested, information on the nutritive value of aquatic products. The feed manufacturer and the farmer require more complete data on the qualities of fishery products for animal feeding. Therefore, it is highly important that our technological staff obtain, as soon as possible, more complete information on this subject, and at least fill in the important gaps in scientific knowledge concerning the unexcelled nutritional value of these products of the sea.

Furthermore, nutrition studies are necessary to properly evaluate our technological investigations on the improvement of existing methods and the design of new methods in the handling, utilization, processing, preservation, and storage of the great diversity of products of the fishery industries.

During 1937 investigations concerning the nutritive value of fishery products and byproducts were conducted in our College Park laboratories under the supervision of James M. Lemon, technologist in charge,

by Dr. Hugo W. Nilson, assistant pharmacologist; S. R. Pottinger, junior technologist; Charles F. Lee, junior chemist; William B. Lanham, Jr., junior chemist; Joseph F. Puncochar, junior bacteriologist; and Willis H. Baldwin and Hillman C. Harris, graduate student assistants, with the cooperation of Professor M. H. Berry of the Dairy Department, Maryland State Agricultural Experiment Station; and in our Seattle laboratory under the supervision of Roger W. Harrison, technologist in charge, assisted by Charles Butler, William Clegg, Louis Simenson, Marie Sater, and Rhea Waterberry, chemists, assigned to our laboratory by the Works Progress Administration; and with the cooperation of Dr. J. S. Carver, Washington State College, Pullman, Wash.

VITAMIN CONTENT OF FISHERY PRODUCTS

As in former years, our nutrition laboratory continued assays of numerous samples of fish oils and fish-liver oils from different species for content of vitamins A and D, prepared experimentally in connection with the byproducts program of our Seattle laboratory. We also began, in cooperation with the Federated Scallop Producers Cooperative Association, determinations of vitamins A and D in scallop waste, but we had to discontinue this work before it was completed because the association and the scallop industry failed to continue its support in supplying samples in accordance with the laboratory schedule. However, preliminary studies indicated a higher vitamin A potency in scallop waste than we have found in the flesh of other species of fish or shellfish previously analyzed.

In a previous section in this report, some studies were discussed which were started in 1937 in connection with the use of ultraviolet rays in killing bacteria in fish. In addition to the value of these rays in reducing the bacterial count in fish so treated, preliminary analyses by the nutrition laboratory showed that the irradiation of haddock fillets by this mercury vapor lamp increased the vitamin D potency of the samples. If more complete data or further studies in this connection substantiate these conclusions, this discovery will have considerable commercial significance, as fish fillets or other edible portions of fish could be irradiated in the same manner as milk is now treated and sold by dairies at a premium as "vitamin D milk."

Recent discoveries in the chemistry of vitamins have shown that the substance which chemists originally classified under the term, "vitamin B," is really a combination of vitamins. This combination or substance is now known as the vitamin B complex. Newer knowledge of vitamins, being obtained by scientists every day, is gradually identifying the vitamins which make up this complex. This means that the interpretations of the results of nearly all of the previous analyses of vitamin B and vitamin G, which formerly was classed with vitamin B in fishery products and in other foods, must be modified in accordance with these more recent discoveries. Therefore, the Bureau's nutrition laboratory has found it necessary to devote a limited amount of time to the development or standardization of new methods of analysis for these vitamins, constituting the vitamin B complex, for application to fishery products. Studies of the vitamin B complex in oysters and in three types of canned salmon have been begun.

CHEMICAL COMPOSITION AND NUTRITIVE VALUE OF FISH PROTEINS

As was discussed in last year's report, technologists in the College Park laboratory began, during the latter part of 1935, a study of the composition and nutritive value of proteins in some of the commercially important species of fish and shellfish. This information has been desired by welfare authorities, physicians, dietitians, and others interested in nutrition and health. Protein, which is the basis of all diets of man and his domestic animals, is a very complex chemical compound and varies in biological or nutritive value according to its composition. To date our technologists have isolated and determined the amounts of cystine, tryptophane, arginine, histidine, and lysine in cod, haddock, sea herring, Boston mackerel, Spanish mackerel, croaker, mullet, shad, red snapper, halibut, lake trout, oysters, crabs, clams, and shrimp. In feeding experiments with laboratory animals, it was found that fish proteins were at least 90 percent digestible. It was also found that the proteins from fishery products were definitely superior to both casein and beef in promoting growth in the experimental animals, when fed in a diet in which the protein was a limiting factor.

The concentrates, extracted from the various species of fish and shellfish mentioned above, constitute a highly nutritious and attractive flour or meal which consists of about 95 percent protein and 3 percent mineral constituents. As it is almost a pure protein, it should have great possibilities as an ingredient of baby and invalid foods. Likewise, it should be well suited for making such bakery products as cookies and crackers. These concentrates could be made on a commercial scale from many species of fish, not now finding a ready sale, as well as from the edible trimmings of our common market fishes.

MINERAL CONSTITUENTS OF FISHERY PRODUCTS AND BYPRODUCTS

As has been stated previously, the mineral constituents of foods are being shown to be of increasing importance as the science of nutrition progresses. About 34 mineral elements have been identified in sea water, and nearly all of them have been found, in traces at least, in aquatic products. Among the minerals which have been shown to be of great importance in nutrition are calcium, phosphorus, iodine, copper, iron, manganese, and magnesium. In general, fishery products are excellent sources of these mineral constituents and superior sources of some of them, such as iodine. In order to determine the relative standing of various fishery products in these minerals, detailed analyses were made, during 1937, of the kinds and quantities of these mineral constituents in cod, haddock, mackerel, salmon (canned), shrimp, crab meat, and oysters.

FISH MEAL IN ANIMAL FEEDING

The Bureau's cooperative experiments with the Department of Poultry Husbandry at Washington State College, Pullman, Wash., were continued during the past year. This work has been concerned largely with the vitamin content of fish meals.

In earlier studies evidence was obtained indicating the practicability of producing fish meals containing sufficient vitamin D to

supply an adequate amount of this vitamin to the ration when the meals are included in normal quantity. In the present work attention is being given to the matter of vitamin retention, since the utility of fish meals must be based on their quality when fed, and this may mean after storage periods up to and exceeding 1 year.

The principal problem in storing meals containing any appreciable quantity of oil is to prevent oxidation changes in the oil which lead to the formation of undesirable rancid products and cause vitamin destruction. The investigation during the past year was designed to study the effect of cereal flours as antioxidants when incorporated with the meal during storage. The experimental samples, however, carried a much higher vitamin content than was anticipated and a proper level of diet was not determined during the time allowed for this particular work. The experiments are being repeated during the present year, and, in addition, attention is being given to the effectiveness of pelleting as a means of preventing deterioration during storage. When the meal is compressed into pellet form the tremendous surface exposed by the finely ground material is drastically reduced, air is excluded and only a limited opportunity for oxidation is permitted.

KELP MEAL IN ANIMAL FEEDING

One of the principal problems of the modern dairy industry, according to animal husbandrymen, is the irregularity in the reproductive capacity of dairy cows. Workers in dairy science have been looking for some means to arrest this condition through improvements in the ration of the dairy herd. Since it has been known for some time that certain minerals influence reproduction and lactation, in their search for dietary solution, the attention of dairy husbandrymen has been directed to so-called mineral feed supplements. Kelp meal, a dried and finely ground product of the giant kelp, a species of seaweed of the Pacific coast, is known to be an excellent organic source of certain minerals which have nutritional value. Dr. McCollum, of Johns Hopkins University, has shown that magnesium and manganese are important in reproduction and lactation in such laboratory test animals as white rats. Kelp meal is an excellent source of these two minerals. Therefore, during the past year, in cooperation with our technologists, Professor M. H. Berry, of the Dairy Department, Maryland State Agricultural Experiment Station, College Park, Md., inaugurated a series of feeding tests with dairy animals to determine whether the addition of kelp meal to these experimental rations would have any value in improving reproduction in dairy cattle. Because of the nature of the experiments and the time element involved, it is expected that at least 3 years will be required to obtain results on which any conclusions can be based.

FISH COOKERY STUDIES AND DEMONSTRATIONS

As stated previously in this report, there has been a great increase in interest on the part of dietitians, home economics workers, and others, in the nutritive value of fishery products and their importance in the diet of the American people. From this, it would naturally be expected that there would be a great need and a great demand for information on fish cookery. Therefore, during 1937, Agnes I. Web-

ster, of the Division's staff, continued her studies and practical demonstrations of fish cookery recipes. In addition to the developing and testing of new recipes in our fish cookery laboratory, Miss Webster also conducted practical demonstrations before home economics workers, housewives, etc., in New Brunswick, N. J.; Baltimore, Md.; and various points in the State of Florida.

During 1937, the Federal Surplus Commodities Corporation purchased a considerable quantity of surplus fish for distribution to persons on relief rolls in various parts of the country. In connection with the distribution of these fish, Miss Webster conducted practical demonstrations in fish cookery before relief workers, and others interested, at various points in the Midwest.

RESEARCH ASSOCIATES AND STUDENT ASSISTANTS

Because of the relatively small size of the Bureau's technological staff, and the rather broad field of research it must cover, it is only possible to undertake those problems which are of a fundamental nature and which promise to be of the greatest value to the largest number of persons, whose livelihood depends in whole or in part on the fisheries, and which are possible with the funds and personnel available. For this reason the Division cannot, with present facilities, attack problems of special or restricted interest affecting certain products, processes, methods, or industries. However, the Bureau has available, by congressional authorization and under an arrangement similar to that of other scientific Government bureaus, facilities for research associates and student assistants in its laboratories. The salaries and expenses of these employees are paid by the firms or groups who are interested in the problems on which they are working and the investigations are carried out under the supervision of the Bureau's technologists in its laboratories and under its control. Thus the Bureau provides these industries and groups with laboratory, consulting, and library facilities which, in most instances, cannot be obtained elsewhere.

Within the limits of its facilities, the Bureau also has opened its technological laboratories to research students who are pursuing courses in universities and who are selecting investigational problems in the fisheries as their major study. This may prove of special benefit to the industry as it brings its problems to the attention of a large group of research workers who in turn may spread interest to applied fishery research.

The following research associates and student assistants carried on investigations under the supervision of our technological staff during the past year:

In the College Park Laboratory, C. E. Swift, research associate, employed by the Musher Foundation, Inc., New York City, working on the problem of rancidity in fishery products and byproducts; Harold E. Crowther, R. H. Flowers, and C. E. Swift, research associates, employed by the Aquacide Co., Washington, D. C., working on problems in the chemical preservation of fishery byproducts; William B. Lanham, Jr. (part of the year), Willis H. Baldwin, Hillman C. Harris, and Louis F. Ortenzio, part-time graduate student assistants, employed by the Bureau of Fisheries and working on problems in the chemistry and metabolism of fish products, lactic acid as an index of decomposi-

tion in fish, and in the handling of fresh oysters; Ned Oakley and Roscoe Dwiggins, student assistants provided by the National Youth Administration through the University of Maryland.

In the Seattle technological laboratory, Leslie Lowen, research associate, employed by the Musher Foundation, Inc., New York City, working on the problem of rancidity in fishery products and by-products; and Neil Nellis and Robert Rucker, student assistants provided by the National Youth Administration through the University of Washington.

The details of the above work has been described in the preceding pages.

EDUCATIONAL AND CONSULTING SERVICE

In addition to the research activities described in this report, our economic and technological staffs conduct, along with their regular duties, an educational and consulting service for those interested in the fisheries. During the past year the demand for this type of service has increased. Many requests have been received from groups and individuals to demonstrate improved methods developed in our laboratories for the handling and processing of fishery products, for instruction in fish cookery, and for aid in improving various marketing practices. Insofar as our facilities have permitted, we have complied with these requests, endeavoring to offer assistance especially where the request has come from a large group or industry. However, we have not been able to comply with all of the requests received because of insufficient personnel and because of inadequate funds to provide for the travel expenses of the demonstrators.

Some of the educational services rendered are discussed or referred to in previous paragraphs of this report. In brief, this work has covered the fields of commercial preserving of fishery products, fish cookery in the home, and the marketing of aquatic products.

Another phase of this service has consisted in answering thousands of letters directed to the Bureau on fishery subjects and in supplying information to persons who have called at the Bureau personally. Many of the latter came from foreign lands to seek fishery information which might be useful in the conduct of the industry in their native country.

PUBLICATIONS OF THE DIVISION

During the calendar year 1937 the following publications were prepared and addresses delivered by members of the Division's staff. These do not include the monthly statistical bulletins of the landings of fishery products at Boston and Gloucester, Mass., Portland, Maine, and Seattle, Wash., nor the monthly reports on cold-storage holdings of frozen fish and quantities of fish frozen. The fishery reports and circulars may be purchased, at the prices shown, from the Superintendent of Documents, Government Printing Office, Washington, D. C. The statistical bulletins and special or S-memoranda are distributed free of charge upon request to the Bureau. The special articles may be obtained from the sources of publication.

Those wishing to receive copies of this report, and statistical bulletins as issued should request that their names be placed on the Bureau's mailing lists, Nos. 128 for the annual statistical report; 128a for general statistical bulletins; and 128b for monthly cold-storage

reports. Those desiring historical statistical data on the domestic fisheries for the period 1880 to 1929 should consult the report entitled "Fishery Industries of the United States, 1930," by R. H. Fiedler, appendix II to the Report of the United States Commissioner of Fisheries for the fiscal year 1931. Statistical information for the years 1930 to 1935, inclusive, may be obtained from the annual reports of the Division for the years 1931 to 1936, inclusive.

DOCUMENTS, REPORTS, AND CIRCULARS

FIEDLER, R. H.

Fishery industries of the United States, 1936. 8°, 276 pp. Administrative Report No. 27. Appendix I to Report of Commissioner of Fisheries, 1937. 25 cents.

HARRISON, ROGER W., ANDREW W. ANDERSON, ARTHUR D. HOLMES, and MADELEINE G. PIGOTT.

Vitamin content of oils from cannery trimmings of salmon from the Columbia River and Puget Sound regions. 8°, 8 pp. Investigational Report No. 36. 5 cents.

SPECIAL ARTICLES AND ADDRESSES

BALDWIN, WILLIS H.

Determination of tryptophane in fish proteins. (Submitted to the Graduate School of the University of Maryland, College Park, Md., as a partial requirement for the degree of Master of Science.)

FIEDLER, R. H.

Tell customers about the health value of fish. Butchers' Advocate, and the Food Merchant, March 10, 1937, p. 16, vol. 101, No. 10, New York, N. Y.

To preserve the catch properly the modern fishing vessel has been developed. First installment, Fishing Gazette, December 1937, p. 8. Second installment, Fishing Gazette, January 1938, p. 22, New York, N. Y.

Marketing and distribution of fish. Address before the National Food Distributors' Association, Chicago, Ill., August 19, 1937. Published as Bureau of Fisheries' Special Memorandum 2450–T, Washington, D. C.

Outline of fishery market news service. Address before the Nineteenth Annual Convention, National Association of Marketing Officials, New York, N. Y., December 18, 1937.

GRIFFITHS, FRANCIS P.

Freezing processes as related to western oyster-marketing methods. Bureau of Fisheries' Special Memorandum No. 2468–G, Washington, D. C.

A review of the bacteriology of fresh marine-fishery products. Bureau of Fisheries' Special Memorandum 3500, Washington, D. C. Reprinted from Food Research, vol. 2, No. 2, 1937, Champaign, Ill.

HARRISON, ROGER W.

Report on fat in fish meal. Published in the Journal of the Association of Official Agricultural Chemists, vol. 20, pp. 447–450, August 1937, Washington, D. C.

Fat in fish meal. Address before the Feedstuffs Section of the Association of Official Agricultural Chemists, November 3, 1937, Washington, D. C.

HARRISON, ROGER W., and ANDREW W. ANDERSON.

Profit possibilities in salmon waste. Pacific Fisherman, vol. 35, No. 1, pp. 20–21, January 1937, Seattle, Wash.

JARVIS, NORMAN D.

Canned frog legs. Bureau of Fisheries' Special Memorandum 3225, Washington, D. C.

The condition of the canned herring roe pack. Address before Virginia Herring Packers Association, May 28, 1937, Heathsville, Va.

Canned alewives (river herring) and alewife roe. Bureau of Fisheries' Memorandum S–344, Washington, D. C. Also published in The Canner, July 29, 1937, Chicago, Ill.

The Alaska crab meat industry. Bureau of Fisheries' Memorandum S–345, Washington, D. C. Also published in The Canner, September 30, 1937, Chicago, Ill.

The quality grading of canned herring roe. Address before Virginia Herring Packers Association, November 1937, Heathsville, Va.

JOHNSON, F. F.
Markets for fish and shellfish. Butchers' Advocate, p. 22, March 31, 1937, New York City, N. Y.

LANHAM, WILLIAM B., Jr.
Nutritive value of the protein of the edible portion of haddock, Boston mackerel, and Spanish mackerel. (Submitted to the Graduate School of the University of Maryland, College Park, Md., as a partial requirement for the degree of Master of Science.)

LEMON, J. M., M. E. STANSBY, and C. E. SWIFT.
Oat flour as an antioxidant in the salt mackerel industry. Food, vol. VI, No. 71, pp. 441–443, August 1937, published at 33 Tothill Street, Westminster, London, S. W. 1. Also published in Food Industries, vol. 9, No. 10, October 1937, McGraw-Hill Publishing Co., New York, N. Y.

LOWEN, LESLIE, LYLE ANDERSON, and ROGER W. HARRISON.
Cereal flours as antioxidants for fishery products. Industrial and Engineering Chemistry, vol. 29, No. 2, pp. 151–156, February 1937, Easton, Pa.

MANNING, J. R.
Value of seafoods in the American dietary. Fishing Gazette, February 1937, New York, N. Y.
Report on fish meal. Address before the Association of American Feed Control Officials, November 5, 1937, Washington, D. C.
Oysters occupy a unique position in food value. Prepared for the Oyster Institute of North America, Washington, D. C.

PUNCOCHAR, JOSEPH F.
Influences of the ultra-violet and X-rays upon bacteria. Bacteriological Graduate Seminar, December 6, 1937. University of Maryland, College Park, Md.

SALTER, L. C.
Men at sea adopt cooperation. Bureau of Fisheries' Special Memorandum 2605, Washington, D. C. Also published in Cooperative Journal, vol. XI, No. 5, September–October 1937, Washington, D. C.
Fishery cooperative marketing in the United States. Bureau of Fisheries' Special Memorandum 2603, Washington, D. C. Address before the Cooperative Institute of St. Francis Xavier University, August 20, 1937, Antigonish, Nova Scotia.
How to improve markets for produce. Bureau of Fisheries' Special Memorandum 2604, Washington, D. C. Address before the Southern New England Fishermen's Association, June 4, 1937, Mystic, Conn.

STANSBY, MAURICE E., and JAMES M. LEMON.
Quantitative determination of oil in fish flesh. Bureau of Fisheries' Special Memorandum 1738–34, Washington, D. C. Reprinted from Analytical Edition, Industrial and Engineering Chemistry, vol. 9, p. 341, July 15, 1937, Easton, Pa.

SUPPLEE, W. C.
Vitamin D content of menhaden fish oil. Bureau of Fisheries' Special Memorandum 2295–N, Washington, D. C. Reprinted from Industrial and Engineering Chemistry, vol. 29, p. 190, February 1937, Easton, Pa.

———.
Migratory fish of the Atlantic and Gulf coasts. Prepared by members of the staffs of Division of Fishery Industries and Division of Scientific Inquiry. Bureau of Fisheries' Special Memorandum 3239, January 1937, Washington, D. C.

STATISTICAL BULLETINS

Fisheries of the New England States, 1935. Statistical Bulletin No. 1229.
Fisheries of the Middle Atlantic States, 1935. Statistical Bulletin No. 1220.
Fisheries of the Chesapeake Bay States, 1935. Statistical Bulletin No. 1215.
Fisheries of the Pacific Coast States, 1935. Statistical Bulletin No. 1231.
Fisheries of the United States and Alaska. Statistical Bulletin No. 1232.
Fisheries of Alaska, 1936. Statistical Bulletin No. 1235.
Manufactured fishery products of the United States and Alaska. Statistical Bulletin No. 1234.
Fishery products frozen and cold-storage holdings of frozen and cured fishery products in the United States and Alaska, 1936. Statistical Bulletin No. 1218.
Production of fresh and frozen packaged fish in the United States, 1936. Statistical Bulletin No. 1240.

Canned fishery products and byproducts of the United States and Alaska, 1936. Statistical Bulletin No. 1239.
Landings by fishing vessels at the three principal New England ports, 1936—by months. Statistical Bulletin No. 1213.
Landings by fishing vessels at the three principal New England ports, 1936—by gear and fishing areas. Statistical Bulletin No. 1223.
Fishery products landed by United States vessels at Seattle, Wash., 1936. Statistical Bulletin No. 1233.

Part 2. FISHERY STATISTICS, 1936

GENERAL REVIEW

Based upon available statistics for 1936, there was a large increase in the catch of fishery products in the United States and Alaska as compared with that of the preceding year. Statistics of the catch were collected for both 1935 and 1936 in the Chesapeake, Pacific, and Lake States and in Alaska, and, when considering the combined catch of these sections alone, an increase of 22 percent in the volume and 19 percent in the value of the catch is indicated. While these increases are reflected in each of the four geographical sections and in many species, they are especially important in increased catches of pilchard in California, and salmon in Alaska. The value of the production of canned fishery products in all sections increased 26 percent as compared with 1935; byproducts increased 17 percent; frozen fish about 1 percent; and packaged fish 6 percent.

The total catch of fishery products in the United States and Alaska as based on the most recent surveys, amounted to 4,840,299,000 pounds, valued at $92,823,000. About 129,000 fishermen were employed in making this catch.

In 1936 in the United States and Alaska, the production of canned fishery products amounted to 794,707,014 pounds, valued at $94,564,254; the output of byproducts was valued at $34,976,347; and production of frozen fishery products, excluding packaged products, amounted to 106,679,695 pounds, estimated to be valued at $8,700,000. Based on the most recent surveys the production of cured fishery products amounted to 116,310,859 pounds, valued at $15,615,682, and fresh and frozen packaged fish and shellfish, 202,395,954 pounds, valued at $26,894,905. It is estimated that about 680,000,000 pounds of fresh fishery products (excluding fresh packaged fish and shellfish), valued at about $55,000,000, were marketed during 1936. The total marketed value to domestic primary handlers of all fishery products in 1936 is estimated at $236,000,000.

Fishery products imported for consumption were valued at $41,872,560 and domestic exports were valued at $13,214,166.

New England States.—No survey for the entire catch of fishery products in these States was made for 1936. In 1935 both the volume and value of the catch showed an increase as compared with 1933, when the first preceding survey of the complete catch was made. There were increases in both the volume and value of the combined

landings of fishery products by vessels at Boston and Gloucester, Mass., and Portland, Maine, and a large increase in the production of Maine sardines in 1936 as compared with 1935.

Middle Atlantic States.—No complete survey for the catch of fishery products in these States was made for 1936. In 1935 there was a large increase in both volume and value of the catch as compared with the catch in 1933, when the first previous survey was made. There was a large increase in the production of frozen fish and in the catch of shad in the Hudson River in 1936 as compared with 1935.

Chesapeake Bay States.—In 1936 the catch of fishery products in the Chesapeake Bay States increased in both volume and value as compared with the preceding year. The value of the menhaden products, which were produced in Virginia, increased appreciably; however, the production of fresh-shucked oysters and packaged fresh-cooked crab meat decreased.

South Atlantic and Gulf States.—The catch of fishery products in the South Atlantic and Gulf States during 1936 showed large increases in both volume and value over 1934, when the first preceding survey of the catch was made. There was a large increase in the volume and value of packaged fresh-cooked crab meat in 1936 as compared with 1934. The output of canned shrimp and oysters in 1936 showed only slight variation from the production in 1935.

Pacific Coast States.—The commercial catch of fishery products in these States for 1936 was the largest of any year on record and the value of the catch exceeded that of any previous year except 1929. The increased volume of the catch was largely accounted for by the record catch of pilchards in California. The 1936 production of canned sardines, tuna, and oysters increased as compared with 1935 while the packs of mackerel and salmon decreased.

Lake States.—In 1936 the commercial catch of fishery products in the Lake States increased in both volume and value as compared with 1935. The catch of blue pike was the largest on record, while that of yellow perch was below normal.

Mississippi River and tributaries.—The most recent complete statistics of the catch of the Mississippi River and tributaries are those collected for 1931. As compared with 1922, when the most recent preceding survey was made, there was a decrease in the catch. This decrease was reflected principally in a smaller catch of fresh-water mussels. A survey made for Lakes Pepin and Keokuk and the Mississippi River between these two lakes showed an increase in 1936 for the catch for Lake Keokuk and the river between the lakes, but a decrease in the figures for Lake Pepin. The production of fresh-water mussel-shell buttons increased in 1936 as compared with 1935.

Alaska.—The catch of fishery products in Alaska in 1936 increased in both volume and value as compared with 1935, and the pack of canned salmon was the largest in history. The production of fresh and frozen fishery products increased while that of byproducts and cured products decreased.

Fisheries of the United States and Alaska

SUMMARY OF CATCH: BY SECTIONS

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Product	New England, 1935 Area XXII		Middle Atlantic, 1935 Area XXIII		Chesapeake, 1936 Area XXIII		South Atlantic and Gulf, 1936 Areas XXIV and XXV		Pacific, 1936	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Fish	609,136	12,539	245,728	2,904	237,230	2,299	385,444	6,444	1,901,038	22,944
Shellfish, etc	46,294	5,445	33,710	3,512	76,865	4,189	171,548	7,098	21,515	1,856
Whale products									2,790	82
Total	655,430	17,984	279,438	6,416	314,095	6,488	556,992	13,542	1,925,343	24,882

Product	Lakes, 1936		Mississippi River and tributaries, 1931		Alaska, 1936		Total for the various years	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Fish	92,888	6,349	44,062	2,257	920,977	13,739	4,436,503	69,475
Shellfish, etc	1,389	40	38,321	640	2,550	152	392,192	22,932
Whale products					8,814	334	11,604	416
Total	94,277	6,389	82,383	2,897	932,341	14,225	4,840,299	92,823

NOTE.—The roman numerals appearing under the names of the sections are the numbers given these areas by the North American Council on Fishery Investigations. It should be explained that there are included under these areas craft whose principal fishing ports are in the respective areas but at times they may fish elsewhere.

OPERATING UNITS: BY SECTIONS

Item	New England, 1935	Middle Atlantic, 1935	Chesapeake, 1936	South Atlantic and Gulf, 1936 [1]	Pacific, 1936
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	5,023	2,499	2,559	3,937	7,408
On boats and shore	13,426	7,121	15,724	25,069	13,212
Total	18,449	9,620	18,283	29,006	20,620
Vessels:					
Steam	39	19	25		2
Net tonnage	5,977	2,090	2,882		41
Motor	582	368	184	951	1,029
Net tonnage	16,074	5,834	2,596	11,585	28,456
Sail		4	145	79	5
Net tonnage		29	1,781	777	2,170
Total vessels	621	391	354	1,030	1,036
Total net tonnage	22,051	7,953	7,259	12,362	30,667
Boats:					
Motor	4,457	1,830	6,648	7,059	5,437
Other	4,623	3,251	5,130	10,051	863
Accessory boats	857	177	112	170	722
Apparatus:					
Haul seines	140	260	360	1,158	254
Purse seines	157	38	33	48	412
Lampara nets					229
Otter trawls	479	175	26	3,649	58
Beam trawls					27
Paranzella nets					12
Gill nets	6,319	1,619	8,657	14,047	3,860
Trammel nets				753	37
Pound nets, trap nets, and weirs	457	577	2,478	2,457	48
Stop nets		68	3		
Fyke nets	303	1,655	2,987	692	1,938
Bag nets	148				11
Other nets [2]	457	489	2,486	9,999	634
Hooks, baits, or snoods	3,236,009	474,013	2,526,096	1,467,904	1,100,171
Fish wheels				13	
Eel pots and traps	3,016	5,349	14,899	2,205	

[1] Includes the fisheries of Lake Okeechobee, Florida.
[2] Includes dip nets, push nets, reef nets, scap nets, drag nets, cast nets, and drop nets.

Fisheries of the United States and Alaska—Continued

OPERATING UNITS: By sections—Continued

Item	New England, 1935	Middle Atlantic, 1935	Chesapeake, 1936	South Atlantic and Gulf, 1936	Pacific, 1936
Apparatus—Continued.	*Number*	*Number*	*Number*	*Number*	*Number*
Brush traps				25,500	
Lobster pots and traps	289,437	17,449			6,705
Crab, crawfish, and turtle pots and traps	6,107	10	275	7,281	33,457
Clam dredges	63	68		1	
Crab dredges		61	232	20	
Mussel dredges		9			
Oyster dredges	160	346	655	724	6
Scallop dredges	3,587	490		74	
Crab scrapes			755		
Tongs, rakes, shovels, hoes, forks, picks, etc	5,721	4,938	8,387	3,484	4,381
Diving outfits				59	22
Other apparatus [3]	1,505	8,729	133	4,971	74

Item	Lakes, 1936	Mississippi River and tributaries, 1931	Alaska, 1936	Total for the various years
Fishermen:	*Number*	*Number*	*Number*	*Number*
On vessels	1,589		[4] 11,722	34,737
On boats and shore	4,034	15,884		94,470
Total	5,623	15,884	11,722	129,207
Vessels:				
Steam	55		7	147
Net tonnage	1,317		547	12,854
Motor	420		893	4,427
Net tonnage	4,750		12,108	81,403
Sail				233
Net tonnage				4,757
Total vessels	475		900	4,807
Total net tonnage	6,067		12,655	99,014
Boats:				
Motor	1,294	4,426	1,318	32,469
Other	1,327	10,120	3,951	39,316
Accessory boats	18			2,056
Apparatus:				
Haul seines	207	1,013	217	3,609
Purse seines			803	1,491
Lampara nets				229
Otter trawls				4,387
Beam trawls			12	39
Paranzella nets				12
Gill nets	119,586	101	4,244	158,433
Trammel nets	78	518		1,386
Pound nets, trap nets, and weirs	8,466	374	460	15,317
Stop nets				71
Fyke nets	1,512	32,541		41,628
Bag nets				159
Other nets [2]		191		14,256
Hooks, baits, or snoods	591,839	2,459,179	([5])	11,855,211
Fish wheels			297	310
Eel pots and traps				25,469
Brush traps				25,500
Lobster pots and traps				313,591
Crab, crawfish, and turtle pots and traps	1,040	456	3,354	51,980
Clam dredges				132
Crab dredges				313
Mussel dredges		440		449
Oyster dredges				1,891
Scallop dredges				4,151
Crab scrapes				755
Tongs, rakes, shovels, hoes, forks, picks, etc	128	3,994		31,033
Diving outfits				81
Crowfoot bars	257	4,480		4,737
Other apparatus [3]		3,781		19,193

[3] Includes periwinkle, cockle and fish pots, harpoons, spears, hooks, grabs, coquina scoops, slat traps, and wire baskets.

[4] Includes persons in boats and shore fisheries.

[5] Number not determined.

Fisheries of the United States and Alaska—Continued

CATCH: By sections

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	New England, 1935		Middle Atlantic, 1935		Chesapeake, 1936		South Atlantic and Gulf, 1936		Pacific, 1936	
FISH	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Alewives	4,406	25	554	7	12,058	109	12,160	131		
Amberjack							13	(6)		
Anchovies	4	(6)							195	2
Angelfish							2	(6)		
Barracuda									2,978	141
Black bass					61	5				
Bluefish	357	32	2,976	193	446	24	5,894	309		
Blue runner or hardtail							615	8		
Bonito	33	2	301	9	53	3				
Bowfin					7	(6)	7	(6)		
Buffalofish							44	2		
Butterfish	2,294	83	6,438	266	2,277	50	358	6		
Cabio or crab eater					9	1	6	(6)		
Cabrilla									197	7
Carp	52	4	494	36	741	28	511	14	196	4
Catfish and bullheads			120	8	743	24	5,132	175	305	37
Cigarfish							11	(6)		
Cod	120,334	2,514	1,856	84	4	(6)			12,922	203
Crappie					10	1	463	16		
Crevalle	1	(6)	1	(6)			183	3		
Croaker	2,350	43	8,042	127	31,255	332	10,277	120		
Cunner	1	(6)	3	(6)						
Cusk	7,556	137								
Dolphin							5	(6)		
Drum:										
Black			9	(6)	15	(6)	2,666	68		
Red or redfish	2	(6)	39	1	38	1	2,990	148		
Eels:										
Common	420	33	619	69	276	21	83	4		
Conger	113	1	21	1	2	(6)				
Flounders	38,734	1,321	9,252	514	455	26	1,795	106	16,242	749
Flyingfish									56	2
Frigate mackerel	82	1	158	2						
Garfish					3	(6)				
Gizzard shad			2	(6)	310	4	42	(6)		
Goosefish	3	(6)	71	1						
Grayfish	35	1	116	2	1	(6)			802	10
Groupers			2	(6)			5,247	156	61	2
Grunts							67	2		
Haddock	194,606	4,276	1,323	61	(6)	(6)				
Hake	26,541	376	209	5	25	(6)			51	1
Halibut	2,925	252							24,892	2,130
Hardhead									107	5
Harvestfish or "starfish"					272	3	893	11		
Herring, sea	54,329	286	334	3	462	2			1,853	14
Herring smelt	13	(6)								
Hickory shad	(6)	(6)	4	(6)	87	2	285	8		
Hogfish					(6)	(6)	13	(6)		
Horse mackerel									4,599	38
Jewfish							63	2		
Kingfish (California)									652	16
Kingfish or "king mackerel"	(6)	(6)	13	1			3,947	161		
King whiting or "kingfish"	5	(6)	71	5	143	4	3,288	72		
Lamprey	2	(6)								
Launce	34	(6)	2	(6)						
"Lingcod"									2,493	75
Mackerel	61,950	1,249	3,082	91	125	8	1	(6)	100,542	932
Marlin									17	1
Menhaden	4,284	14	179,603	474	167,559	916	233,463	927		
Minnows	4	3								
Mojarra							352	8		
Mooneye										
Moonfish							2	(6)		
Mullet			99	4	105	5	42,543	1,354	11	1
Mummichog	6	1	13	1						
Muttonfish							165	12		
Paddlefish or spoonbill cat							14	1		
Permit							24	1		
Pigfish			(6)	(6)	7	(6)	101	2		
Pike or pickerel (jacks)			(6)	(6)	40	7	1	(6)		

6 Less than 500 pounds or dollars.

Fisheries of the United States and Alaska—Continued

CATCH: BY SECTIONS—Continued

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	New England, 1935		Middle Atlantic, 1935		Chesapeake, 1936		South Atlantic and Gulf, 1936		Pacific, 1936	
FISH—continued	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Pilchard									1,502,299	7,099
Pilotfish	1	(6)								
Pinfish							63	1		
Pollock	33,394	547	22	1	(6)	(6)				
Pompano			4	1	(6)	(6)	738	153	8	4
Rock bass									416	21
Rockfishes									5,289	185
Rosefish	17,157	184								
Rudderfishes					(6)	(6)			44	2
Sablefish									4,073	149
Salmon:										
Atlantic	40	10								
Blueback, red, or sockeye									3,790	337
Chinook or king									32,531	2,465
Chum or keta									13,109	223
Humpback or pink									124	2
Silver or coho									14,477	680
Sculpin									129	10
Scup or porgy	6,751	160	7,095	135	1,479	20	37	1		
Sea bass	3,416	122	2,089	106	106	7	347	19	398	22
Sea bass, white (California)									808	62
Sea catfish							290	7		
Sea robin	276	3	92	2	1	(6)				
Shad	727	40	1,329	132	2,185	235	1,791	274	2,996	67
Sharks	81	1	45	1	11	(6)	1,113	4		
Sheepshead:										
Fresh water							1	(6)		
Salt water					(6)	(6)	1,217	34	129	4
Silversides			70	3						
Skates	227	3	132	1	2	(6)			382	4
Skipper or "billfish"	(6)	(6)								
Smelt	729	86							3,978	129
Snapper:										
Mangrove							243	10		
Red			15	1			7,321	458		
Snook or sergeantfish							612	24		
Spadefish							25	1		
Spanish mackerel			24	2	21	1	9,458	391	18	1
Splittail									29	1
Spot			19	1	947	18	8,338	185		
Squawfish									(6)	(6)
Squeteagues or "sea trout:"										
Gray	327	15	10,140	321	11,689	226	8,972	314		
Spotted			3	(6)	116	7	8,681	615		
White							487	18		
Squirrel hake			25	(6)						
Steelhead trout									2,693	144
Striped bass	22	3	62	8	2,383	176	768	61	29	2
Sturgeon	5	1	20	3	27	2	105	9	182	6
Sturgeon, shovelnose										
Suckers	97	4	89	6	9	(6)	7	(6)	48	1
Sunfish			1	(6)	4	(6)	677	19		
Surffishes (perch)									322	13
Swellfish			5	(6)	2	(6)	1	(6)		
Swordfish	2,986	424	43	9					577	64
Tautog	259	11	43	1	2	(6)				
Tenpounder							56	1		
Thimble-eyed mackerel	46	(6)	245	4						
Tilefish	161	8	2,494	94						
Tomcod	17	1	7	(6)	(6)	(6)			4	(6)
Tripletail							38	1		
Tullibees										
Tuna and tunalike fishes:										
Albacore									984	91
Bluefin or horse mackerel	538	14	24	2	(6)	(6)			18,925	922
Bonito									7,216	221
Skipjack									26,992	1,191
Yellowfin									78,353	4,139
White bass										
Whitebait			9	1					198	9

6 Less than 500 pounds or dollars.

Fisheries of the United States and Alaska—Continued

CATCH: BY SECTIONS—Continued

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	New England, 1935		Middle Atlantic, 1935		Chesapeake, 1936		South Atlantic and Gulf, 1936		Pacific, 1936	
FISH—continued	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Whitefish:										
Common									47	3
Menominee										
White perch	51	6	113	7	483	20	194	10		
Whiting	17,415	182	5,629	96	20	(6)				
Wolffish	2,934	60			(6)	(6)				
Yellow perch	3	(6)	13	1	154	11	23	1		
Yellow pike										
Yellowtail							115	6	10,092	299
Miscellaneous									178	2
Total	609,136	12,539	245,728	2,904	237,230	2,299	385,444	6,444	1,901,038	22,944
SHELLFISH, ETC.										
Crabs:										
Hard	3,106	59	1,297	40	39,432	887	29,237	454	7,191	602
King or "horseshoe"			3,135	9						
Soft and peelers	(6)	(6)	390	107	4,239	418	594	115		
Stone							46	9		
Crawfish									87	10
Lobsters:										
Common	10,853	2,520	643	139	(6)	(6)				
Spiny							327	20	1,335	148
Shrimp			194	13			118,109	3,778	2,344	45
Abalone									660	93
Clams:										
Coquina							4	1		
Hard	4,057	451	5,217	794	2,673	412	1,494	118	892	67
Pismo									52	11
Razor	583	14							925	140
Soft	9,802	561	1,834	143					29	6
Surf	1	(6)	837	37						
Mixed									86	6
Conchs			9	1			8	(6)		
Mussels, sea	117	3	98	6	78	2				
Octopus									162	8
Oysters, market:										
Eastern, public	64	11	346	51	18,548	1,417	11,563	752		
Eastern, private	9,940	1,199	14,465	1,677	11,766	1,047	9,067	689	60	19
Japanese									6,377	457
Western									317	214
Periwinkles and "cockles"	159	7								
Scallops:										
Bay	1,504	261	107	36			431	47	22	5
Sea	1,670	231	2,640	344						
Squid	3,543	57	2,423	67	122	4			962	25
Sea urchins	35	(6)								
Terrapin					5	2	30	5		
Turtles			21	1	2	(6)	149	5	3	(6)
Irish moss	8	(6)								
Sponges							490	1,105		
Bloodworms	283	38	24	20						
Sandworms	569	33	30	27						
Trepang									10	(6)
Other shellfish									(6)	(6)
Total	46,294	5,445	33,710	3,512	76,865	4,189	171,549	7,098	21,514	1,856
WHALE PRODUCTS [7]										
Meat									1,600	32
Oil, whale									1,190	50
Total									2,790	82
Grand total	655,430	17,984	279,438	6,416	314,095	6,488	556,993	13,542	1,925,342	24,882

[6] Less than 500 pounds or dollars.

[7] The weight of whales caught was not determined; therefore, the weight of the manufactured products s shown.

Fisheries of the United States and Alaska—Continued

CATCH: BY SECTIONS—Continued

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	Lakes, 1936		Mississippi River and tributaries, 1931		Alaska, 1936		Total for the various years	
FISH	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Alewives							29,178	272
Amberjack							13	(6)
Anchovies							199	2
Angelfish							2	(6)
Barracuda							2,978	141
Black bass			14	2			75	7
Bluefish							9,673	558
Blue pike	19,936	1,197					19,936	1,197
Blue runner or hardtail							615	8
Bonito							387	14
Bowfin	1	(6)	428	10			443	10
Buffalofish			15,772	687			15,816	689
Burbot	630	7					630	7
Butterfish							11,367	405
Cabio or crab eater							15	1
Cabrilla							197	7
Carp	4,972	129	11,892	456			18,858	671
Catfish and bullheads	925	52	10,267	878			17,492	1,174
Chubs	6,365	778					6,365	778
Cigarfish							11	(6)
Cisco	68	7					68	7
Cod					722	4	135,838	2,805
Crappie	(6)	(6)	41	3			514	20
Crevalle							185	3
Croaker							51,924	622
Cunner							4	(6)
Cusk							7,556	137
Dolly Varden trout					16	1	16	1
Dolphin							5	(6)
Drum:								
Black							2,690	68
Red or redfish							3,069	150
Eels:								
Common	44	2	7	(6)			1,449	129
Conger							136	2
Flounders							66,478	2,716
Flyingfish							56	2
Frigate mackerel							240	3
Garfish			73	1			76	1
Gizzard shad							354	4
Goldfish	336	10					336	10
Goosefish							74	1
Grayfish							954	13
Groupers							5,310	158
Grunts							67	2
Haddock							195,929	4,337
Hake							26,826	382
Halibut					19,381	959	47,198	3,341
Hardhead							107	5
Harvestfish or "starfish"							1,165	14
Herring:								
Lake	20,758	572					20,758	572
Sea					172,828	864	229,806	1,169
Herring smelt							13	(6)
Hickory shad							376	10
Hogfish							13	(6)
Horse mackerel							4,599	38
Jewfish							63	2
Kingfish (California)							652	16
Kingfish or "king mackerel"							3,960	162
King whiting or "kingfish"							3,507	81
Lake trout	9,406	1,394					9,406	1,394
Lamprey							2	(6)
Launce							36	(6)
"Lingcod"							2,493	75
Mackerel							165,700	2,280
Marlin							17	1
Menhaden							584,909	2,331
Minnows			1	(6)			5	3
Mojarra							352	8
Mooneye	9	(6)	3	(6)			12	(6)
Moonfish							2	(6)
Mullet							42,758	1,364
Mummichog							19	2

6 Less than 500 pounds or dollars.

Fisheries of the United States and Alaska—Continued

CATCH: BY SECTIONS—Continued

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	Lakes, 1936		Mississippi River and tributaries, 1931		Alaska, 1936		Total for the various years	
FISH—continued	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Muttonfish							165	12
Paddlefish or spoonbill cat			951	43			965	44
Permit							24	1
Pigfish							108	2
Pike or pickerel (jacks)	321	16	5	(6)			367	23
Pilchard							1, 502, 299	7, 099
Pilotfish							1	(6)
Pinfish							63	1
Pollock							33, 416	548
Pompano							750	158
Quillback			268	11			268	11
Rock bass	22	1					438	22
Rockfishes					33	1	5, 322	186
Rosefish							17, 157	184
Rudderfishes							44	2
Sablefish					1, 102	50	5, 175	199
Salmon:								
Atlantic							40	10
Blueback, red, or sockeye					226, 965	5, 366	230, 755	5, 703
Chinook or king					17, 882	409	50, 413	2, 874
Chum or keta					108, 555	1, 028	121, 664	1, 251
Humpback or pink					351, 258	4, 595	351, 382	4, 597
Silver or coho					22, 193	459	36, 670	1, 139
Sauger	2, 172	126	3	(6)			2, 175	126
Sculpin							129	10
Scup or porgy							15, 362	316
Sea bass							6, 356	276
Sea bass, white (California)							808	62
Sea catfish							290	7
Sea robin							369	5
Shad							9, 028	748
Sharks							1, 250	6
Sheepshead:								
Fresh water	3, 520	72	3, 905	143			7, 426	215
Salt water							1, 346	38
Silversides							70	3
Skates							743	8
Skipper or "billfish"							(6)	(6)
Smelt	1, 202	37					5, 909	252
Snapper:								
Mangrove							243	10
Red							7, 336	459
Snook or sergeantfish							612	24
Spadefish							25	1
Spanish mackerel							9, 521	395
Splittail							29	1
Spot							9, 304	204
Squawfish							(6)	(6)
Squeteagues or "sea trout":								
Gray							31, 128	876
Spotted							8, 800	622
White							487	18
Squirrel hake							25	(6)
Steelhead trout	2	(6)			42	3	2, 737	147
Striped bass							3, 264	250
Sturgeon	25	8					364	29
Sturgeon, shovelnose			87	8			87	8
Suckers	5, 905	152	315	13			6, 470	176
Sunfish	15	(6)	22	1			719	20
Surffishes (perch)							322	13
Swellfish							8	(6)
Swordfish							3, 606	497
Tautog							304	12
Tenpounder							56	1
Thimble-eyed mackerel							291	4
Tilefish							2, 655	102
Tomcod							28	1
Tripletail							38	1
Tullibees	103	2					103	2
Tuna and tunalike fishes:								
Albacore							984	91
Bluefin or horse mackerel							19, 487	938
Bonito							7, 216	221
Skipjack							26, 992	1, 191
Yellowfin							78, 353	4, 139

6 Less than 500 pounds or dollars.

Fisheries of the United States and Alaska—Continued

CATCH: BY SECTIONS—Continued

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Species	Lakes, 1936		Mississippi River and tributaries, 1931		Alaska, 1936		Total for the various years	
FISH—continued	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
White bass	664	33	3	(6)			667	33
Whitebait							207	10
Whitefish:								
Common	4,131	768					4,178	771
Menominee	167	10					167	10
White perch							841	43
Whiting							23,064	278
Wolffish							2,934	60
Yellow perch	5,957	421					6,150	434
Yellow pike	5,232	555	5	1			5,237	556
Yellowtail							10,207	305
Miscellaneous							178	2
Total	92,888	6,349	44,062	2,257	920,977	13,739	4,436,503	69,475
SHELLFISH, ETC.								
Crabs:								
Hard					902	79	81,165	2,121
King (Pacific coast)					2	(6)	2	(6)
King or "horseshoe"							3,135	9
Soft and peelers							5,223	640
Stone							46	9
Crawfish	42	4	29	(6)			158	14
Lobsters:								
Common							11,496	2,659
Spiny							1,662	168
Shrimp			49	4	866	33	121,562	3,873
Abalone							660	93
Clams:								
Coquina							4	1
Hard							14,333	1,842
Pismo							52	11
Razor					780	40	2,288	194
Soft							11,665	710
Surf							838	37
Mixed							86	6
Conchs							17	1
Mussels, sea							293	11
Mussel shells	1,347	35	37,255	422			38,602	457
Octopus							162	8
Oysters, market:								
Eastern, public							30,521	2,231
Eastern, private							45,298	4,631
Japanese							6,377	457
Western							317	214
Periwinkles and "cockles"							159	7
Scallops:								
Bay							2,064	349
Sea							4,310	575
Squid							7,050	153
Sea urchins							35	(6)
Terrapin			19	(6)			54	7
Turtles			94	3			269	9
Frogs			875	131			875	131
Irish moss							8	(6)
Sponges							490	1,105
Pearls and slugs		1		80				81
Bloodworms							307	58
Sandworms							599	60
Trepang							10	(6)
Other shellfish							(6)	(6)
Total	1,389	40	38,321	640	2,550	152	392,192	22,932
WHALE PRODUCTS [7]								
Meat							1,600	32
Fertilizer					2,368	38	2,368	38
Oil, sperm					1,450	46	1,450	46
Oil, whale					4,996	250	6,186	300
Total					8,814	334	11,604	416
Grand total	94,277	6,389	82,383	2,897	932,341	14,225	4,840,299	92,823

[6] Less than 500 pounds or dollars.

[7] The weight of whales caught was not determined; therefore, the weight of the manufactured products is shown.

Fisheries of the United States and Alaska—Continued

CATCH: BY STATES [8]

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

States	Marine and coastal rivers		Mississippi River and tributaries		Lakes [9]		Total	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Alabama	9, 253	356	1, 822	33			11, 075	389
Arkansas			15, 733	412			15, 733	412
California	1, 760, 183	17, 286					1, 760, 183	17, 286
Connecticut	14, 916	1, 217					14, 916	1, 217
Delaware	86, 666	430					86, 666	430
Florida	171, 250	5, 162			2, 353	76	173, 603	5, 238
Georgia	27, 352	469					27, 352	469
Illinois			14, 263	367	1, 368	133	15, 631	500
Indiana			7, 717	157	684	51	8, 401	208
Iowa			7, 778	303			7, 778	303
Kansas			456	17			456	17
Kentucky			1, 622	61			1, 622	61
Louisiana	74, 395	2, 698	19, 213	994			93, 608	3, 692
Maine	112, 219	3, 309					112, 219	3, 309
Maryland	43, 791	2, 176					43, 791	2, 176
Massachusetts	503, 417	12, 148					503, 417	12, 148
Michigan					29, 674	2, 350	29, 674	2, 350
Minnesota			3, 498	137	7, 993	353	11, 491	490
Mississippi	26, 595	926	2, 650	123			29, 245	1, 049
Missouri			928	77			928	77
Nebraska			145	16			145	16
New Hampshire	354	62					354	62
New Jersey	107, 802	2, 844					107, 802	2, 844
New York	84, 939	3, 135			1, 290	92	86, 229	3, 227
North Carolina	219, 879	2, 735					219, 879	2, 735
Ohio			185	7	31, 099	1, 711	31, 284	1, 718
Oklahoma			40	4			40	4
Oregon	57, 741	1, 995					57, 741	1, 995
Pennsylvania	31	6			3, 899	348	3, 930	354
Rhode Island	24, 524	1, 248					24, 524	1, 248
South Carolina	8, 488	344					8, 488	344
South Dakota			114	11			114	11
Tennessee			3, 435	104			3, 435	104
Texas	17, 428	777	139	6			17, 567	783
Virginia	270, 304	4, 312					270, 304	4, 312
Washington	107, 418	5, 600					107, 418	5, 600
Wisconsin			2, 645	68	18, 270	1, 352	20, 915	1, 420
Alaska	932, 341	14, 225					932, 341	14, 225
Total	4, 661, 286	83, 460	82, 383	2, 897	96, 630	6, 466	4, 840, 299	92, 823

SEED OYSTER FISHERY

Item	New England, 1935	Middle Atlantic, 1935
OPERATING UNITS		
Fishermen:	*Number*	*Number*
On vessels	137	1, 151
On boats and shore:		
Regular	29	74
Casual	1	154
Total	167	1, 379
Vessels:		
Steam	4	
Net tonnage	344	
Motor	9	5
Net tonnage	236	85
Sail	15	109
Net tonnage	114	2, 246
Total vessels	28	114
Total net tonnage	694	2, 331

[8] The catch for "Marine and coastal rivers" is for 1936 except in the New England and Middle Atlantic States which is for 1935; the catch of the "Mississippi River and tributaries" is for 1931; and the catch of the "Lakes" is for 1936.

[9] Includes Lake Ontario, Lake Erie, Lake Huron, Lake Michigan, Lake Superior, Rainy Lake, Namakan Lake, Lake of the Woods, Lake Okeechobee, and several mussel-bearing streams tributary to Lakes Huron, Erie, and Michigan.

Fisheries of the United States and Alaska—Continued

SEED OYSTER FISHERY—Continued

Item	New England, 1935		Middle Atlantic, 1935	
OPERATING UNITS—continued				
Boats:	*Number*		*Number*	
Motor	1		73	
Other	15		145	
Apparatus:				
Dredges, oyster	161		230	
Yards at mouth	142		283	
Tongs	7		202	
Rakes			25	
CATCH				
Oysters, seed:	*Bushels*	*Value*	*Bushels*	*Value*
Public, spring	17,355	$6,942	913,505	$302,954
Public, fall	88,888	35,658	24,465	6,502
Private, spring	355,843	162,334	30,659	18,412
Private, fall	20,725	13,600	11,215	10,128
Total	482,811	218,534	979,844	337,996

Item	Chesapeake, 1936		South Atlantic and Gulf, 1936		Total	
OPERATING UNITS	*Number*		*Number*		*Number*	
Fishermen:						
On vessels	46				1,334	
On boats and shore:						
Regular	1,187		55		1,345	
Casual	164		45		364	
Total	1,397		100		3,043	
Vessels:						
Steam					4	
Net tonnage					344	
Motor	16				30	
Net tonnage	87				408	
Sail					124	
Net tonnage					2,360	
Total vessels	16				158	
Total net tonnage	87				3,112	
Boats:						
Motor	488		37		599	
Other	267				427	
Apparatus:						
Dredges, oyster			37		428	
Yards at mouth			25		450	
Tongs	1,029				1,238	
Rakes	188				213	
CATCH						
Oysters, seed:	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*
Public, spring	350,593	$62,893	55,500	$11,100	1,336,953	$383,889
Public, fall	479,501	139,831			592,854	181,991
Private, spring	15,040	3,008			401,542	183,754
Private, fall					31,940	23,728
Total	845,134	205,732	55,500	11,100	2,363,289	773,362

NOTE.—Of the number of persons fishing for seed oysters, a total of 2,654 are duplicated among those fishing for market oysters or other species. Similarly, the following craft and gear are duplicated: 93 vessels, 527 motor boats, 267 other boats, 168 dredges, 1,017 tongs, and 196 rakes.

Yield of the fisheries of the United States: By gear

Gear	New England, 1935		Middle Atlantic, 1935		Chesapeake, 1936	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Purse seines	87,259,900	$1,249,300	175,514,600	$492,484	165,853,200	$912,195
Haul seines	780,400	37,580	1,739,800	76,005	5,678,100	149,587
Gill nets	29,674,200	609,943	2,867,900	183,821	1,416,700	109,659
Lines	87,788,200	2,022,257	6,848,900	327,926	33,245,700	736,793
Pound nets	22,956,200	265,206	42,022,600	994,073	55,296,200	889,397
Floating traps	11,952,300	233,815				
Other traps	37,000	3,135			8,400	334
Weirs	21,250,500	104,281	1,392,000	2,508		
Stop nets			156,800	11,120	92,000	3,304
Fyke nets	146,900	8,258	408,600	21,491	839,900	39,043
Dip nets	2,796,800	83,188	[1] 703,700	[1] 113,066	2,319,300	252,102
Cast nets			2,600	185		
Scap nets			119,700	4,423		
Bag nets	146,600	17,080				
Drag nets			11,700	2,800		
Push nets	14,400	4,800				
Otter trawls	344,801,900	7,585,204	19,067,900	803,090	7,945,800	189,374
Pots	14,273,400	2,597,879	1,966,100	209,422	379,700	18,251
Harpoons	3,246,000	428,837	42,600	8,850		
Spears	28,300	2,556	90,200	11,229		
Scrapes, crab					1,556,300	114,149
Dredges	12,987,900	1,604,006	18,015,200	2,045,705	15,345,400	913,663
Tongs	2,467,000	279,512	2,996,800	477,449	22,108,300	1,918,555
Rakes	1,271,800	161,058	3,059,900	420,181	1,227,500	116,790
Forks	705,200	39,497	529,600	91,691		
Hoes	10,562,500	608,372	1,055,900	69,878		
Picks					238,700	55,870
Gaffs			500	25		
By hand	283,000	37,830	824,500	48,242	543,600	68,575
Total	655,430,400	17,983,594	279,438,100	6,415,664	314,094,800	6,487,641

Gear	South Atlantic and Gulf, 1936		Pacific, 1936		Lakes, 1936	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Purse seines	233,187,900	$931,240	1,309,626,200	$7,835,965		
Haul seines	45,444,000	1,412,257	4,966,500	280,292	5,006,400	$161,857
Gill nets	54,353,100	2,117,295	34,782,900	1,744,375	41,029,600	3,178,274
Trammel nets	8,477,600	418,393	1,395,000	97,855	141,400	2,874
Lines	49,275,100	1,508,290	188,539,500	9,613,771	2,061,200	302,316
Pound nets	19,441,200	448,529	1,282,900	70,737	7,603,100	453,358
Other traps	231,900	29,822	8,914,100	772,007	33,937,500	2,082,700
Weirs			843,600	7,761		
Wheels	70,500	1,330				
Fyke nets	441,000	13,879	380,300	39,173	3,108,700	167,927
Dip nets	2,299,400	84,719	4,523,100	222,631		
Drag-bag nets			1,772,400	25,026		
Cast nets	438,600	21,389				
Push nets	[2] 4,300	[2] 720				
Reef nets			273,800	15,933		
Lampara and ring nets			337,403,000	2,260,902		
Paranzella nets			11,452,200	591,282		
Otter trawls	117,685,500	3,731,954	5,815,900	120,129		
Beam trawls			601,500	25,337		
Pots	1,771,400	62,765			41,500	4,150
Harpoons			3,370,400	146,092		
Spears	536,800	38,870				
Dredges	10,138,900	659,209	[3]	[3]		
Tongs	8,107,000	673,883	8,738,600	919,530		
Crowfoot bars					913,800	22,500
Rakes	868,800	82,171	[3]	[3]		
Forks	7,400	777				
Grabs	1,911,600	96,050				
Picks					310,600	10,313
Hooks	140,000	185,011				
Diving apparatus, abalone and sponge	358,500	920,758	660,400	92,711		
By hand	1,802,200	102,990			122,700	3,174
Total	556,992,700	13,542,301	1,925,342,300	24,881,509	94,276,500	6,389,443

[1] Includes the catch by drop nets and wire baskets.
[2] This catch was made by scoop nets.
[3] The catch by shovels, rakes, and dredges is included with tongs.

Yield of the fisheries of the United States: By gear—Continued

Gear	Mississippi River and tributaries, 1931		Total	
	Pounds	*Value*	*Pounds*	*Value*
Purse seines			1,971,441,800	$11,421,184
Haul seines	13,739,657	$574,541	77,354,857	2,692,119
Gill nets	166,598	6,547	164,290,998	7,949,914
Trammel nets	1,134,206	75,615	11,148,206	594,737
Lines	10,140,037	772,245	377,898,637	15,283,598
Pound nets	224,275	9,541	148,826,475	3,130,841
Floating traps			11,952,300	233,815
Other traps			43,128,900	2,887,998
Weirs			23,486,100	114,550
Wheels			70,500	1,330
Stop nets			248,800	14,424
Fyke nets	18,507,204	797,130	23,832,604	1,086,901
Dip nets	30,045	3,307	12,672,345	759,013
Drag-bag nets			1,772,400	25,026
Cast nets			441,200	21,574
Scap nets			119,700	4,423
Bag nets			146,600	17,080
Drag nets			11,700	2,800
Push nets			18,700	5,520
Reef nets			273,800	15,933
Lampara and ring nets			337,403,000	2,260,902
Paranzella nets			11,452,200	591,282
Otter trawls			495,317,000	12,429,751
Beam trawls			601,500	25,337
Pots	[4] 310,455	[4] 26,277	18,742,555	2,918,744
Harpoons			6,659,000	583,779
Spears	2,250	270	657,550	52,925
Scrapes, crab			1,556,300	114,149
Dredges	3,699,100	40,958	60,186,500	5,263,541
Tongs	1,601,876	21,091	46,019,576	4,290,020
Crowfoot bars	20,893,550	265,443	21,807,350	287,943
Rakes	370,130	4,029	6,798,130	784,229
Forks	4,812,737	76,214	6,054,937	208,179
Hoes			11,618,400	678,250
Grabs	873,099	130,621	2,784,699	226,671
Picks			549,300	66,183
Hooks			140,000	185,011
Diving apparatus, abalone and sponge			1,018,900	1,013,469
Gaffs			500	25
By hand	5,877,304	93,528	9,453,304	354,339
Total	82,382,523	2,897,357	3,907,957,323	78,597,509

[4] Includes the catch by baskets.

Industries related to the fisheries of the United States and Alaska

Item	New England, 1935	Middle Atlantic, 1935	Chesapeake, 1936	South Atlantic and Gulf, 1936
Transporting:				
Persons engaged:	*Number*	*Number*	*Number*	*Number*
On vessels	124	69	1,181	339
On boats	18	72		295
Total	142	141	1,181	634
Vessels:				
Motor	50	23	486	141
Net tonnage	909	378	5,919	1,366
Sail			1	34
Net tonnage			47	332
Total vessels	50	23	487	175
Total net tonnage	909	378	5,966	1,698
Boats	15	63		231
Wholesale and manufacturing:				
Establishments	380	408	585	703
Persons engaged:				
Proprietors	265	302	745	722
Salaried employees	718	1,071	392	557
Wage earners:				
Average for season	9,578	4,770	11,526	15,816
Average for year	5,501	3,485	4,486	4,701
Salaries and wages paid	$6,456,456	$6,666,507	$3,073,443	$3,296,241
Manufactured products [4]	[5] $25,476,907	[5] $14,691,923	$9,813,684	$11,445,674
Fishermen's manufactured products:				
Persons engaged	3,792	558	97	1,316
Products [4]	$680,020	$378,741	$8,325	$143,784

[4] Includes packaged, cured, and canned fishery products, and byproducts.
[5] Includes data for 1936 on packaged and canned products and byproducts.

Industries related to the fisheries of the United States and Alaska—Continued

Item	Pacific, 1936	Lakes, 1936	Mississippi River and tributaries, 1931	Alaska, 1936	Total for the various years
Transporting:					
Persons engaged:	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	206	14	29	2,064	4,026
On boats				[1]	385
Total	206	14	29	2,064	4,411
Vessels:					
Steam	1			9	10
Net tonnage	32			21,551	21,583
Motor	78	8	8	429	1,223
Net tonnage	1,659	115	104	13,468	23,918
Sail					35
Net tonnage					379
Total vessels	79	8	8	438	1,268
Total net tonnage	1,691	115	104	35,019	45,880
Boats				[2] 776	1,085
Wholesale and manufacturing:					
Establishments	339	214	217	249	3,095
Persons engaged:					
Proprietors	349	154	204		
Salaried employees	1,054	448	355	16,597	87,307
Wage earners:					
Average for season	15,186	2,223	4,275		
Average for year	5,666	1,178	3,483	[3]	[3]
Salaries and wages paid	$9,365,375	$2,439,107	$3,080,430	[3]	[3]
Manufactured products [4]	[5] $52,498,170	$2,660,163	[6] $4,002,120	$48,641,265	$169,229,906
Fishermen's manufactured products:					
Persons engaged	278	480	216	[3]	[3]
Products [4]	$232,009	$51,438	$8,751	[3]	[3]

[1] Included in vessels.
[2] Includes scows, houseboats, pile drivers, etc.
[3] Statistics not available.
[4] Includes packaged, cured, and canned fishery products, and byproducts.
[5] Includes data for 1936 on packaged and canned products and byproducts.

NOTE.—Of the total number of persons engaged in the preparation of fishermen's manufactured products, 6,203 have also been included as fishermen, and 1,235 of the persons shown on transporting craft have also been included as fishermen.

MANUFACTURED FISHERY PRODUCTS

The output of manufactured fishery products (canned, cured, packaged, and byproducts) in the United States and Alaska during the most recent years for which data are available were valued at $172,051,188. Of this amount, canned products accounted for 55 percent, byproducts 20 percent, fresh and frozen packaged products 16 percent, and cured products 9 percent.

Since general statistical surveys were conducted in only the Chesapeake Bay, South Atlantic, Gulf, Lakes, and Pacific States, and Alaska for 1936, the following compilation of manufactured fishery products consists of composite data, based on the most recent statistics. The years covered by the data are indicated by footnotes.

Manufactured fishery products of the United States and Alaska [1]

Item	Quantity	Value
Alewives:		
Salted:		
Corned ---- pounds	7,760,200	$76,201
Pickled ---- do	[2] 3,766,710	92,938
Tight-pack [3] ---- do	1,536,880	37,985
Tight-pack cut ---- do	979,640	38,346
Smoked [4] ---- do	198,338	8,116
Canned ---- standard cases	24,140	58,527
Roe, canned ---- do	32,985	232,783
Dry scrap ---- tons	557	16,502
Oil ---- gallons	6,550	1,363
Barracuda, fresh fillets ---- pounds	860,000	107,500
Buffalofish, smoked [5] ---- do	885,300	220,595
Butterfish, smoked [5] ---- do	730,876	189,487
Cabrilla, fresh fillets ---- do	60,000	8,400
Cabrilla, dry salted ---- do	5,186	467
Carp, smoked [5] ---- do	213,645	39,994
Chubs, cisco, and tullibees, smoked [5] ---- do	6,815,906	1,894,347
Cod:		
Fresh fillets ---- do	9,458,021	1,093,265
Frozen fillets ---- do	8,057,162	766,125
Fresh sticks ---- do	380,607	35,807
Salted:		
Green [4] ---- do	[2] 8,565,639	450,458
Dry [4] ---- do	2,249,212	141,144
Boneless and absolutely boneless [4] ---- do	7,950,957	1,491,780
Tongues ---- do	12,250	986
Pickled ---- do	80,769	2,821
Smoked fillets [3] ---- do	1,043,598	152,181
Stockfish ---- do	9,355	1,304
Oil:		
Cod ---- gallons	17,542	7,049
Cod liver ---- do	281,374	170,779
Croaker, fresh fillets ---- pounds	232,182	28,278
Cusk:		
Fresh fillets ---- do	711,601	70,010
Frozen fillets ---- do	240,609	20,349
Fresh sticks ---- do	466,399	49,074
Salted, green [3] ---- do	[2] 74,040	2,492
Smoked fillets [3] ---- do	82,005	10,801
Drum, black and red, fresh fillets and steaks ---- do	10,862	1,685
Eels:		
Salted ---- do	107,240	8,195
Smoked [5] ---- do	112,053	31,173
Flounders:		
Fresh fillets ---- do	4,925,761	772,272
Frozen fillets ---- do	924,726	133,787
Grayfish, fresh fillets ---- do	110,000	11,000
Groupers:		
Fresh fillets ---- do	32,900	5,410
Fresh steaks ---- do	359,804	56,120
Haddock:		
Fresh fillets ---- do	18,368,725	2,110,526
Frozen fillets ---- do	22,795,346	2,151,557
Fresh sticks ---- do	22,850	4,108
Salted, green [3] ---- do	[2] 26,850	541
Finnan haddie [3] ---- do	355,000	45,014
Hake:		
Fresh fillets ---- do	1,432,262	133,797
Frozen fillets ---- do	2,030,712	137,280
Fresh sticks ---- do	439,535	44,529
Salted:		
Green [3] ---- do	[2] 1,892,855	55,769
Dry [3] ---- do	2,087,892	97,450
Boneless and absolutely boneless [3] ---- do	1,259,122	94,928
Smoked fillets [3] ---- do	78,245	9,968
Halibut:		
Fresh fillets ---- do	57,920	17,326
Frozen steaks ---- do	271,530	40,525
Herring, lake:		
Fresh fillets ---- do	212,778	21,410
Salted fillets ---- do	4,576,835	173,478
Smoked fillets ---- do	846,369	74,221
Herring, sea:		
Salted:		
Pickled (for bait) ---- do	586,200	6,000
Pickled and spiced [4] ---- do	662,200	50,869
Roused ---- do	66,800	11,597
Scotch cure ---- do	11,413,225	538,211
Norwegian cure ---- do	2,125	92
Split [3] ---- do	1,085,787	35,848

See footnotes at end of table.

Manufactured fishery products of the United States and Alaska—Continued

Item	Quantity	Value
Herring, sea—Continued.		
Smoked:		
Bloaters, hard [3]	pounds	378,180	$25,863
Bloaters, soft [3]	do	834,346	75,173
Bloaters, unclassified [4]	do	518,276	73,341
Boneless [3]	do	2,603,604	275,654
Lengthwise [3]	do	117,105	7,093
Medium scaled [3]	do	351,550	23,388
Kippered [3]	do	275,120	34,394
Canned "sardines"	standard cases	1,845,860	5,740,454
Meal	tons	16,780	593,357
Oil	gallons	3,796,586	954,706
Lake trout:		
Fresh fillets	pounds	18,066	4,153
Salted [5]	do	27,100	2,595
Smoked [4]	do	797,464	214,263
"Lingcod," fresh fillets	do	232,000	28,900
Mackerel:		
Fresh fillets	do	132,166	12,713
Frozen fillets	do	392,189	38,230
Salted:		
Fillets [3]	do	1,874,480	152,083
Split [3]	do	2,477,507	196,832
Smoked [4]	do	564,544	84,288
Canned	standard cases	1,236,850	3,542,895
Meal	tons	3,025	90,254
Oil	gallons	191,753	63,454
Menhaden:		
Acid scrap	tons	23,482	359,615
Dry scrap	do	34,834	1,148,416
Meal	do	7,577	263,294
Oil	gallons	4,880,879	1,249,708
Mullet:		
Salted	pounds	2,004,500	111,470
Roe, salted	do	23,850	5,653
Smoked	do	15,550	2,743
Paddlefish or spoonbill cat:		
Roe, salted [7]	do	1,595	812
Smoked [8]	do	334,500	135,045
Pike, pickerel, and sauger:		
Fresh fillets	do	4,528,569	947,206
Frozen fillets	do	300,762	68,803
Smoked	do	200	30
Pilchard:		
Canned "sardines"	standard cases	2,616,530	7,302,273
Meal	tons	121,739	3,968,305
Oil	gallons	26,131,439	8,336,079
Pollock:		
Fresh fillets	pounds	2,365,566	170,995
Frozen fillets	do	12,571,911	799,117
Fresh sticks	do	48,000	3,810
Salted:		
Green [3]	do	118,946	4,253
Dry [3]	do	203,497	12,097
Rockfishes, fresh fillets	do	950,000	122,000
Rosefish:		
Fresh fillets	do	3,941,008	374,187
Frozen fillets	do	11,580,471	1,139,629
Sablefish:		
Fresh fillets	do	165,000	17,800
Kippered	do	477,142	80,630
Pickled	do	134,730	5,017
Salted	do	276,897	15,036
Smoked [6]	do	94,740	27,570
Sailfish, smoked	do	18,000	3,600
Salmon:		
Fresh and frozen, fillets and steaks	do	13,778	2,619
Salted:		
Dry	do	30,100	4,035
Pickled	do	872,915	96,510
Mild cured	do	11,550,402	2,245,316
Caviar	do	121,208	11,191
Dried	do	1,442,000	57,680
Kippered [4]	do	2,705,408	541,907
Smoked [5]	do	8,752,891	2,655,837
Canned:		
Blueback, red, or sockeye	standard cases	2,571,227	21,924,089
Chinook or king	do	278,151	3,429,814
Chum or keta	do	1,244,957	4,465,074
Humpback or pink	do	4,559,964	17,979,145
Silver or coho	do	291,596	2,058,309

See footnotes at end of table.

Manufactured fishery products of the United States and Alaska—Continued

Item	Quantity	Value
Salmon—Continued.		
Canned—Continued.		
Steelhead trout—standard cases	19,282	$204,640
Eggs for bait—do	2,992	60,670
Eggs for food—do	2,149	44,997
Meal—tons	1,657	55,128
Oil:		
Edible—gallons	13,372	20,058
Industrial—do	132,620	39,243
Sea bass:		
Fresh fillets (Atlantic coast)—pounds	117,500	19,165
Black, fresh steaks (Pacific coast)—do	240,000	29,100
White, fresh fillets (Pacific coast)—do	165,000	29,325
Shad:		
Kippered and smoked [4]—do	178,892	33,976
Canned—standard cases	17,345	46,805
Roe, canned—do	3,604	113,087
Shark:		
Fins—pounds	4,412	2,043
Oil—gallons	1,250	286
Liver oil—do	2,860	1,010
Sheepshead:		
Fresh fillets—pounds	96,652	8,487
Smoked [7]—do	617	77
Snapper:		
Mangrove and red, fresh fillets—do	98,762	29,400
Red, fresh steaks—do	16,800	3,510
Spanish mackerel:		
Fresh fillets—do	24,419	4,092
Salted—do	97,000	4,920
Spot, salted—do	323,500	13,655
Squeteagues or "sea trout", fresh fillets—do	410,861	56,900
Sturgeon:		
Roe, salted [6]—do	760	1,400
Smoked and kippered [5]—do	1,686,204	1,070,856
Caviar, canned—standard cases	3,112	426,254
Suckers, smoked—pounds	500	75
Swordfish, fresh and frozen steaks—do	475,073	107,167
Totuava, fresh steaks—do	675,000	108,000
Tuna and tunalike fishes:		
Canned:		
Albacore—standard cases	63,120	418,003
Bluefin—do	314,019	1,633,701
Bonito—do	131,137	577,098
Striped—do	428,848	2,215,513
"Tonno"—do	172,326	1,212,103
Yellowfin—do	1,437,236	8,079,499
Yellowtail—do	134,048	579,474
Meal—tons	8,822	269,155
Oil—gallons	166,161	34,767
White bass, fresh fillets—pounds	19,857	2,883
Whitefish:		
Fresh fillets—do	34,487	8,045
Smoked [5]—do	2,525,377	723,043
Caviar, canned—standard cases	1,867	54,358
Whiting:		
Frozen fillets—pounds	2,518,628	122,381
Frozen sticks—do	6,278,613	314,438
Fresh and frozen, split, butterfly—do	149,775	8,350
Smoked [3]—do	350	35
Wolffish:		
Fresh fillets—do	22,666	2,549
Frozen fillets—do	175,860	18,847
Yellow perch:		
Fresh fillets—do	377,286	89,693
Frozen fillets—do	8,981	2,396
Smoked—do	200	30
Crabs, hard:		
Meat, packaged, fresh cooked [4]—do	7,095,033	2,535,247
Canned—standard cases	7,300	130,753
Dry scrap—tons	1,644	32,650
Crabs, king, dry scrap—do	603	21,515
Lobsters, common, packaged, fresh cooked [3]—pounds	121,004	129,515
Shrimp:		
Fresh packaged—do	467,407	159,420
Frozen packaged—do	3,722,100	432,592
Cooked and peeled—do	673,454	206,165
Sun dried—do	1,836,631	320,106
Canned—standard cases	917,440	4,672,198
Bran or meal—tons	1,896	37,471
Abalone steaks—pounds	656,700	199,402

See footnotes at end of table.

Manufactured fishery products of the United States and Alaska—Continued

Item	Quantity	Value
Clams, hard:		
Fresh shucked [4] gallons	44,729	$61,457
Canned:		
Whole standard cases	29,872	142,280
Minced do	32,331	161,838
Juice do	10,138	33,655
Chowder do	404,676	1,387,154
Broth, bouillon, and cocktail do	8,973	42,098
Shells, ground, poultry feed tons	1,419	14,280
Clams, razor:		
Fresh shucked [3] gallons	30,915	13,132
Canned:		
Whole standard cases	3,751	32,401
Minced do	61,815	496,799
Juice do	120	476
Clams, soft:		
Fresh shucked [3] gallons	254,856	274,951
Steamed [3] pounds	[2] 228,873	19,494
Canned:		
Whole standard cases	105,672	373,773
Chowder do	79,185	271,767
Juice do	15,875	24,595
Clams, mixed, fresh shucked gallons	3,440	3,784
Marine-shell products:		
Buttons gross	5,764,824	3,565,744
Novelties		700,242
Mussels, fresh water, shell products:		
Buttons gross	18,020,811	4,621,371
Poultry feed tons	4,723	25,744
Lime do	1,966	1,736
Oysters:		
Eastern:		
Fresh shucked [4] gallons	6,310,708	8,549,809
Canned standard cases	409,852	1,676,599
Japanese:		
Fresh shucked gallons	423,066	519,997
Canned standard cases	118,853	504,270
Native, Pacific, fresh shucked gallons	24,440	178,988
Soup, canned (Eastern and Japanese) standard cases	35,430	181,201
Shell products:		
Poultry feed tons	300,128	1,245,553
Lime and dust do	72,354	246,141
Lime, burned do	9,802	72,134
Scallops, bay, fresh shucked [4] gallons	191,100	514,097
Scallops, sea, fresh shucked [3] do	381,954	485,178
Squid, canned standard cases	8,068	30,708
Alligator hides [7] pounds	88,356	7,363
Terrapin products, canned standard cases	219	14,497
Turtle products, canned do	4,129	68,500
Whale products:		
Meal, meat tons	789	28,404
Meal, bone do	395	9,480
Oil, whale gallons	3,953,668	1,658,419
Oil, sperm do	201,298	49,142
Unclassified products:		
Fillets, fresh pounds	[9] 177,564	[9] 24,323
Fillets, frozen do	[10] 78,450	[10] 12,155
Steaks, fresh do	[11] 59,009	[11] 7,343
Miscellaneous, packaged, fresh and frozen [4] do	[12] 437,792	[12] 52,826
Salted [4] do	[13] 1,310,561	[13] 148,962
Smoked [4] do	[14] 232,616	[14] 31,391
Canned:		
Fish for cat and dog food standard cases	267,425	743,968
Fish cakes, balls, etc do	88,926	641,268
Fish chowder do	1,879	11,590
Fish flakes do	27,210	234,091
Fish pudding (salmon) do	75	500
Other do	[15] 25,417	[15] 287,710
Acid and dry scrap tons	[16] 1,594	[16] 36,191
Meal:		
Groundfish (white fish) do	14,188	619,900
Miscellaneous do	[17] 4,196	[17] 146,761
Oil:		
Fur seal gallons	23,669	7,229
Liver, miscellaneous do	[18] 67,166	[18] 2,724,866
Miscellaneous do	[19] 33,631	[19] 10,308

See footnotes at end of table.

Manufactured fishery products of the United States and Alaska—Continued

Item	Quantity	Value
Unclassified products—Continued.		
Glue—gallons	433,412	$902,264
Other byproducts		[20] 546,868
Total, fresh and frozen packaged products—pounds	202,395,954	26,894,905
Total, cured products—do	116,310,859	15,615,682
Total, canned products—do	794,707,014	94,564,254
Total, byproducts		34,976,347
Grand total		172,051,188

[1] Data are for 1936 unless otherwise indicated.
[2] This is usually an intermediate product and although shown in the total may also be shown in its final stage of processing elsewhere in the table.
[3] Data are for 1935.
[4] This item represents a combination of 1936 and 1935 data.
[5] This item represents a combination of 1936, 1935, and 1931 data.
[6] This item represents a combination of 1936 and 1931 data.
[7] Data are for 1931.
[8] This item represents a combination of 1935 and 1931 data.
[9] Includes fresh fillets of amberjack, bluefish, catfish and bullheads, jewfish, kingfish or "king mackerel," king whiting or "kingfish," mullet, scup or porgy, sea robin, snook or sergeantfish, spot, suckers, tripletail, tullibees, and whiting.
[10] Includes frozen fillets of bluefish, halibut, lake herring, and squeteagues or "sea trout."
[11] Includes fresh steaks of cabio, cod, haddock, halibut, pollock, sea bass (Atlantic coast), and snook or sergeantfish.
[12] Includes frozen steaks of cod, pollock, and wolffish; packaged fresh-cooked spiny lobster meat; and fresh-shucked sea mussels.
[13] Includes salted barracuda, bluefish, blue runner, chubs, cod strips and bits, haddock, salmon bellies, sea herring, black sea bass, pilchard, tenpounder, tuna, and yellowtail; tight-pack alewife roe; boneless cusk, mild-cured shad; pickled shrimp; and salted fillets of hake, sea herring, and Spanish mackerel.
[14] Includes smoked bluefish, cod, red drum, flounders, goldfish, goosefish, haddock, smelt, swordfish, tuna, fillets of haddock and sea herring, sea herring roe, and spiced salmon.
[15] Includes canned Alaska salted cod, pickled eels, finnan haddie, smoked salmon, kippered sturgeon, fresh-water crawfish, shrimp soup, hard clams steamed in the shell, hard clam stew, soft clam cakes, coquina clam broth, pickled sea mussels, frogs and frog legs, deep sea roe, rat poison bait, fish paste and bouillon, and crab and shrimp gumbo.
[16] Includes sea herring and groundfish (white fish), dry scrap, and miscellaneous acid and dry scrap.
[17] Includes burbot, tullibee, salmon-egg, abalone, soft clam, cod-liver, and miscellaneous fish meals.
[18] Includes burbot-, halibut-, "lingcod-," sablefish-, swordfish-, totuava-, and tuna-liver oils.
[19] Includes rosefish and miscellaneous fish oils.
[20] Includes isinglass, kelp products, pearl essence, shark skins, and fresh-water mussel-shell novelties, stucco, and chips.

NOTE.—Some of the above products have been manufactured from products imported from another country; therefore, they cannot be correlated directly with the catch within the United States and Alaska.

CANNED FISHERY PRODUCTS AND BYPRODUCTS TRADE

The output of canned fishery products and byproducts in the United States and Alaska in 1936 was valued at $129,533,238. Of this total, canned products comprised $94,564,254, and byproducts, $34,968,984—an increase of 26 percent in the value of canned products and 18 percent in the value of byproducts when compared with the respective values of the same groups of commodities for the previous year.

Fishery products were canned at 412 establishments in the United States and Alaska during 1936. The combined output of these canneries amounted to 20,097,976 standard cases. The net weight of the products canned amounted to 794,707,014 pounds.

Canned fishery products or byproducts were prepared in 25 States and in Alaska during 1936. Alaska ranked first in the value of the products, accounting for 36 percent of the total, and California ranked second, with 31 percent.

Canned fishery products and byproducts of the United States and Alaska, 1936

SUMMARY OF PRODUCTION: BY COMMODITIES

Product	Number of plants	Standard cases	Pounds	Value
Canned products:				
Salmon:				
United States	26	527,574	25,323,552	$5,309,438
Alaska	117	8,437,603	405,004,944	44,751,633
Sardines:				
Maine	24	1,845,860	46,146,500	5,740,454
California	31	2,616,530	125,593,440	7,302,273
Tuna and tunalike fishes	16	2,680,734	64,337,616	14,715,391
Mackerel	30	1,236,850	59,368,800	3,542,895
Alewives	6	24,140	1,158,720	58,527
Alewife roe	31	32,985	1,583,280	232,783
Shad	10	17,345	832,560	46,805
Shad roe	8	3,604	172,992	113,087
Fish flakes	3	27,210	1,306,080	234,091
Fish cakes, balls, etc	6	88,926	4,268,448	641,268
Cat and dog food	8	267,425	12,836,400	743,968
Sturgeon caviar	5	3,112	149,376	426,254
Whitefish roe and caviar	5	1,867	89,616	54,358
Salmon roe and caviar (for food)	4	2,149	103,152	44,997
Salmon eggs (for bait)	8	2,992	143,616	60,670
Miscellaneous fish and roe	13	20,066	963,168	263,350
Clam products	58	[1] 754,334	19,123,095	2,976,297
Oysters	52	528,705	7,930,575	2,180,869
Oyster soup	5	35,430	1,700,640	181,201
Shrimp	61	917,440	15,365,884	4,672,198
Crabs	14	7,300	350,400	130,753
Squid	3	8,068	387,264	30,708
Turtle products	4	4,129	198,192	68,500
Miscellaneous shellfish, etc	12	5,598	268,704	41,486
Total	[2] 412	20,097,976	794,707,014	94,564,254
Byproducts:			*Quantity*	*Value*
Oyster and marine clam-shell products			tons 383,703	1,578,108
Fresh-water mussel-shell products				4,710,260
Marine pearl-shell products				4,265,986
Scrap, meal, etc			tons 243,778	7,696,398
Marine-animal oils			gallons 39,901,818	15,328,466
Miscellaneous byproducts				1,389,766
Total				34,968,984
Grand total				129,533,238

[1] "Cutout" or "drained" weights of can contents are included for whole or minced clams, and gross can contents for other clam products.

[2] Exclusive of duplication.

VALUE OF PRODUCTION: BY STATES

State	Canned products	Byproducts	Total
Maine	$6,609,060	$329,238	$6,938,298
Massachusetts	1,117,229	2,398,722	3,533,255
Rhode Island		17,304	
Connecticut		1,159,719	1,159,719
New York	659,528	3,003,062	3,662,590
New Jersey	1,293,945	1,912,293	3,457,723
Pennsylvania		251,485	
Delaware		232,483	232,483
Maryland	260,965	1,168,270	1,429,235
Virginia	129,954	1,825,696	1,955,650
North Carolina	58,628	552,395	978,861
South Carolina	367,838		
Georgia	825,402	752,118	2,055,271
Florida	477,751		
Alabama	190,485	81,762	2,253,242
Mississippi	1,980,995		
Louisiana	2,354,116	328,773	2,682,889
Texas, Missouri, Wisconsin, and Minnesota	307,445	197,629	505,074
Iowa		3,672,242	3,672,242
Washington	3,582,880	1,080,317	4,663,197
Oregon	2,972,959	263,796	3,236,755
California	26,296,129	13,893,020	40,189,149
Alaska	45,078,945	1,848,660	46,927,605
Total	94,564,254	34,968,984	129,533,238

Canned fishery products and byproducts of the United States and Alaska, 1936—Con.

PACK OF CANNED SALMON: STANDARD CASES

Product	Alaska							
	Southeast		Central		Western		Total	
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*	*Cases*	*Value*
Chinook or king:								
1-pound tall	15,273	$103,563	16,401	$113,381	4,100	$27,622	35,774	$244,566
1-pound flat	1,102	10,839	4,414	43,051	206	1,886	5,722	55,776
½-pound flat	4,130	40,084	6,258	72,118			10,388	112,202
Total	20,505	154,486	27,073	228,550	4,306	29,508	51,884	412,544
Blueback, red, or sockeye:								
1-pound tall	160,289	1,293,449	676,644	5,371,035	1,410,300	11,609,419	2,247,233	18,273,903
1-pound flat	13,591	135,910	102,492	935,832	2,007	18,589	118,090	1,090,331
½-pound flat	44,127	477,055	77,693	949,791	15,399	184,794	137,219	1,611,640
Total	218,007	1,906,414	856,829	7,256,658	1,427,706	11,812,802	2,502,542	20,975,874
Silver or coho:								
1-pound tall	128,293	827,483	83,792	531,146	1,571	10,552	213,656	1,369,181
1-pound flat	2	14	1,333	10,082			1,335	10,096
½-pound flat	6,427	59,030	882	7,761			7,309	66,791
Total	134,722	886,527	86,007	548,989	1,571	10,552	222,300	1,446,068
Humpback or pink:								
1-pound tall	2,889,946	11,456,128	1,601,376	6,174,077	31,066	123,303	4,522,388	17,753,508
½-pound flat	35,198	211,367	2,208	13,379			37,406	224,746
Total	2,925,144	11,667,495	1,603,584	6,187,456	31,066	123,303	4,559,794	17,978,254
Chum or keta:								
1-pound tall	777,653	2,799,016	295,374	1,034,318	26,556	97,245	1,099,583	3,930,579
½-pound flat	686	3,763	814	4,551			1,500	8,314
Total	778,339	2,802,779	296,188	1,038,869	26,556	97,245	1,101,083	3,938,893
Grand total	4,076,717	17,417,701	2,869,681	15,260,522	1,491,205	12,073,410	8,437,603	44,751,633

Product	United States						Grand total, Alaska and United States	
	Washington		Oregon		Total			
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*	*Cases*	*Value*
Chinook or king:								
1-pound tall	11,796	$78,571	6,833	$33,830	18,629	$112,401	54,403	$356,967
1-pound oval	102	2,244	485	10,670	587	12,914	587	12,914
1-pound flat	12,558	143,554	37,972	428,351	50,530	571,905	56,252	627,681
½-pound oval	2	48	55	1,320	57	1,368	57	1,368
½-pound flat	37,135	537,011	106,723	1,556,453	143,858	2,093,464	154,246	2,205,666
¼-pound flat	929	16,183	11,677	209,035	12,606	225,218	12,606	225,218
Total	62,522	777,611	163,745	2,239,659	226,267	3,017,270	278,151	3,429,814
Blueback, red, or sockeye:								
1-pound tall							2,247,233	18,273,903
1-pound oval	3	43			3	43	3	43
1-pound flat	27,248	354,224	156	2,122	27,404	356,346	145,494	1,446,677
½-pound flat	34,917	501,114	4,416	61,824	39,333	562,938	176,552	2,174,578
¼-pound oval	4	83			4	83	4	83
¼-pound flat	1,691	25,205	250	3,600	1,941	28,805	1,941	28,805
Total	63,863	880,669	4,822	67,546	68,685	948,215	2,571,227	21,924,089
Silver or coho:								
1-pound tall	3,928	27,496	827	5,489	4,755	32,985	218,411	1,402,166
1-pound oval			42	462	42	462	42	462
1-pound flat	8,547	67,058	11,841	94,728	20,388	161,786	21,723	171,882
½-pound oval			26	364	26	364	26	364
½-pound flat	17,104	156,923	17,742	156,130	34,846	313,053	42,155	379,844
¼-pound oval	18	316			18	316	18	316
¼-pound flat	5,630	63,056	3,591	40,219	9,221	103,275	9,221	103,275
Total	35,227	314,849	34,069	297,392	69,296	612,241	291,596	2,058,309

Canned fishery products and byproducts of the United States and Alaska, 1936—Con.

PACK OF CANNED SALMON: STANDARD CASES—Continued

Product	United States						Grand total, Alaska and United States	
	Washington		Oregon		Total			
Humpback or pink:	*Cases*	*Value*	*Cases*	*Value*	*Cases*	*Value*	*Cases*	*Value*
1-pound tall	78	$312			78	$312	4, 522, 466	$17, 753, 820
1-pound flat	6	29			6	29	6	29
½-pound flat	86	550			86	550	37, 492	225, 296
Total	170	891			170	891	4, 559, 964	17, 979, 145
Chum or keta:								
1-pound tall	104, 264	$380, 678	37, 049	$131, 177	141, 313	511, 855	1, 240, 896	4, 442, 434
1-pound flat	13	57			13	57	13	57
½-pound flat	854	4, 783	1, 694	9, 486	2, 548	14, 269	4, 048	22, 583
Total	105, 131	385, 518	38, 743	140, 663	143, 874	526, 181	1, 244, 957	4, 465, 074
Steelhead:								
1-pound tall	705	4, 935	617	4, 319	1, 322	9, 254	1, 322	9, 254
1-pound flat	1, 027	8, 216	3, 722	29, 776	4, 749	37, 992	4, 749	37, 992
½-pound oval			1, 810	26, 788	1, 810	26, 788	1, 810	26, 788
½-pound flat	628	6, 280	4, 846	48, 460	5, 474	54, 740	5, 474	54, 740
¼-pound flat	1, 375	17, 600	4, 552	58, 266	5, 927	75, 866	5, 927	75, 866
Total	3, 735	37, 031	15, 547	167, 609	19, 282	204, 640	19, 282	204, 640
Grand total	270, 648	2, 396, 569	256, 926	2, 912, 869	527, 574	5, 309, 438	8, 965, 177	50, 061, 071

NOTE.—"Standard cases" represents the various sized cases converted to the equivalent of 48 1-pound cans to the case. Salmon were canned at 19 plants in Washington, 7 in Oregon, and 117 in Alaska.

PACK OF CANNED SARDINES

Sardines (herring)	Maine		Sardines (pilchard)	California	
Quarters, ¼-pound (100 cans):	*Cases*	*Value*	1-pound oval (48 cans):	*Cases*	*Value*
In olive oil	8, 522	$46, 180	In mustard	373, 176	$991, 623
In cottonseed oil	1, 594, 706	5, 007, 081	In tomato sauce	1, 246, 445	3, 317, 467
In mustard	128, 509	430, 896	In natural oil	44, 810	119, 393
In tomato sauce	10, 211	36, 651	In other sauces or oils	11, 546	38, 546
Three-quarters, ¾-pound (48 cans):			½-pound oval (48 cans):		
In mustard	72, 161	219, 646	In natural oil	40, 638	67, 041
			1-pound tall (48 cans):		
			In natural oil	468, 147	1, 025, 115
			½-pound oblong (48 cans):		
			In natural oil	92, 853	239, 771
			5-ounce eastern oyster (100 cans):		
			In tomato sauce	33, 684	87, 254
			In natural oil	239, 861	624, 952
			108-ounce (6 cans):		
			In various sauces or oils	5, 224	11, 989
			½-pound (96 cans):		
			In natural oil	162, 670	467, 949
			Other sizes:		
			In various sauces or oils (standard cases)	60, 504	311, 173
Total	1, 814, 109	5, 740, 454	Total	2, 779, 558	7, 302, 273
Total (standard cases)	1, 845, 860		Total (standard cases)	2, 616, 530	

NOTE.—"Standard cases" represents the various sized cases converted to the uniform basis of 100 ¼-pound cans to the case of sardines (herring), and 48 1-pound cans to the case of sardines (pilchard). Sardines were canned at 24 plants in Maine and 31 in California.

Canned fishery products and byproducts of the United States and Alaska, 1936—Con.

PACK OF CANNED TUNA AND TUNALIKE FISHES IN CALIFORNIA

Product and size	Albacore		Yellowfin		Bluefin		Striped	
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*	*Cases*	*Value*
¼-pound (48 cans)	596	$2,566	146,528	$570,432	27,618	$104,731	32,835	$116,196
½-pound (48 cans)	40,463	280,342	1,035,428	5,931,655	249,585	1,300,773	368,765	1,900,153
1-pound (48 cans)	[3] 8,276	[3] 108,111	[3] 89,694	[3] 919,701	15,137	140,599	19,462	178,895
Total (actual cases)	49,335	391,019	1,271,650	7,421,788	292,340	1,546,103	421,062	2,195,244
Total (standard cases)	57,313		1,288,080		293,668		424,106	
Flakes:								
½-pound (48 cans)	[4] 3,509	[4] 17,455	[4] 117,334	[4] 529,580	16,303	71,524	[5] 4,742	[5] 20,269
1-pound (48 cans)	1,149	9,529	[6] 15,911	[6] 128,131	[6] 2,024	[6] 16,074	([5])	([5])
Total (actual cases)	4,658	26,984	133,245	657,711	18,327	87,598	4,742	20,269
Total (standard cases)	5,807		149,156		20,351		4,742	
Grand total (actual cases)	53,993	418,003	1,404,895	8,079,499	310,667	1,633,701	425,804	2,215,513
Grand total (standard cases)	63,120		1,437,236		314,019		428,848	

Product and size	"Tonno"		Bonito		Yellowtail		Total	
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*	*Cases*	*Value*
¼-pound (48 cans)			([7])	([7])	([4])	([4])	207,577	$793,925
¼-pound (100 cans)	154,496	$1,134,026	[7] 4,702	[7] $31,748			159,198	1,165,774
½-pound (48 cans)	[8] 11,403	[8] 78,077	96,727	428,641	[4] 95,790	[4] $428,406	1,898,161	10,348,047
1-pound (48 cans)	([8])	([8])	14,756	116,709	19,129	151,068	166,454	1,615,083
Total (actual cases)	165,899	1,212,103	116,185	577,098	114,919	579,474	2,431,390	13,922,829
Total (standard cases)	172,326		131,137		134,048		2,500,678	
Flakes:								
½-pound (48 cans)							141,888	638,828
1-pound (48 cans)							19,084	153,734
Total (actual cases)							160,972	792,562
Total (standard cases)							180,056	
Grand total (actual cases)	165,899	1,212,103	116,185	577,098	114,919	579,474	2,592,362	14,715,391
Grand total (standard cases)	172,326		131,137		134,048		2,680,734	

[3] Includes the pack in 4-pound cans, 12 to the case, which has been converted to the equivalent of 1-pound cans, 48 to the case.

[4] The pack in ¼-pound cans, 48 to the case, has been converted to the equivalent of ½-pound cans, 48 to the case.

[5] The pack of flakes in 1-pound cans, 48 to the case, and creamed tuna in ¾-pound cans, 48 to the case, has been converted to the equivalent of ½-pound cans, 48 to the case.

[6] Includes the pack of creamed tuna in ¾-pound cans, 48 to the case, which has been converted to the equivalent of 1-pound cans, 48 to the case.

[7] The pack in ¼-pound cans, 48 to the case, has been converted to the equivalent of ¼-pound cans, 100 to the case.

[8] The pack in ½-pound cans, 50 to the case and in 1-pound cans, 48 to the case, has been converted to the equivalent of ½-pound cans, 48 to the case.

NOTE.—"Standard cases" represents the various sized cases converted to the equivalent of 48 ½-pound cans to the case. Tuna and tunalike fishes were canned at 16 plants in California.

Canned fishery products and byproducts of the United States and Alaska, 1936—Con.

PACK OF CANNED MACKEREL

Size	Cases	Value
8-ounce (48 cans)	17,367	$51,408
8-ounce (96 cans)	62,111	196,562
16-ounce (48 cans)	[9] 1,158,794	[9] 3,223,001
Other sizes (standard cases)	7,262	71,924
Total (actual cases)	1,245,534	3,542,895
Total (standard cases)	1,236,850	

[9] Includes a small amount of mackerel chowder.

NOTE.—"Standard cases" represents the various sized cans converted to the equivalent of 48 1-pound cans to the case. Mackerel were canned at 1 plant in Maine, 1 in Massachusetts, and 28 in California.

PACK OF CANNED ALEWIVES AND ALEWIFE ROE: STANDARD CASES

Product	Maine and North Carolina		Maryland		Virginia		Total	
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*	*Cases*	*Value*
Alewives			20,949	$50,438	3,191	$8,089	24,140	$58,527
Alewife roe	9,017	$60,308	7,024	51,610	16,944	120,865	32,985	232,783
Total	9,017	60,308	27,973	102,048	20,135	128,954	57,125	291,310

PACK OF CANNED ALEWIVES AND ALEWIFE ROE: ACTUAL CASES

Product and size	Cases	Value
Alewives; 14, 16, and 17 ounces (24 cans)	[10] 52,891	[10] $58,527
Alewife roe:		
8-ounce (48 cans)	17,422	62,704
10-ounce (48 cans)	833	3,534
16 and 17 ounce (24 cans)	[11] 44,932	[11] 166,545
Total		232,783
Grand total		291,310

[10] Includes the pack in 28-ounce cans, 24 to the case, which has been converted to the equivalent of 14-ounce cans, 24 to the case.

[11] Includes the pack in 18- and 19-ounce cans, 24 to the case, which has been converted to the equivalent of 16-ounce cans, 24 to the case.

NOTE.—"Standard cases" represents the various sized cases converted to the equivalent of 48 1-pound cans to the case. Alewives or alewife roe were canned at 1 plant in Maine, 8 in Maryland, 19 in Virginia, and 4 in North Carolina.

PACK OF CANNED OYSTERS: STANDARD CASES

State	Cases	Value	State	Cases	Value
New Jersey, Maryland, and Georgia	8,792	$35,549	Louisiana	57,567	$218,992
South Carolina	86,227	367,838	Washington	118,853	504,270
Florida and Alabama	34,734	133,322	Total	528,705	2,180,869
Mississippi	222,532	920,898			

Canned fishery products and byproducts of the United States and Alaska, 1936—Con.

PACK OF CANNED OYSTERS: ACTUAL CASES

Size	Cases	Value	Size	Cases	Value
3½-ounce (48 cans)	20,848	$73,757	8-ounce (48 cans)	54,622	$347,035
4-ounce (48 cans)	15,233	60,130	10-ounce (24 cans)	39,449	166,271
5-ounce (48 cans)	362,324	1,472,411			
8-ounce (24 cans)	[12] 15,946	[12] 61,265	Total		2,180,869

[12] Includes the pack in 6-ounce cans, 24 and 48 to the case, which has been converted to the equivalent of 8-ounce cans, 24 to the case.

NOTE.—"Standard cases" represents the various sized cases converted to the equivalent of 48 5-ounce cans to the case. Oysters were canned at 1 plant in New Jersey, 1 in Maryland, 5 in South Carolina, 1 in Georgia, 2 in Florida, 3 in Alabama, 15 in Mississippi, 10 in Louisiana, and 14 in Washington. The pack of oyster soup has not been included in the pack of oysters, but has been shown under "Pack of Miscellaneous Canned Fishery Products."

PACK OF CANNED CLAMS AND CLAM PRODUCTS: STANDARD CASES

Product and State	Whole		Minced		Chowder	
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*
Soft clams:						
Maine and Massachusetts	[14] 105,672	[14] $373,773			79,185	$271,767
Hard clams:						
Maryland					42,795	84,961
Washington	[15] 30,226	[15] 144,540	23,599	$107,523	247	1,011
Massachusetts, Rhode Island, New York, New Jersey, Pennsylvania, and Florida	([15])	([15])	[16] 8,732	[16] 54,315	361,998	1,302,638
Total	30,226	144,540	32,331	161,838	405,040	1,388,610
Razor clams:						
Washington	2,492	23,006	36,017	296,719		
Oregon	50	450	998	7,138		
Alaska	1,209	8,945	24,800	192,942		
Total	3,751	32,401	61,815	496,799		
Grand total	139,649	550,714	94,146	658,637	484,225	1,660,377

Product and State	Juice, bouillon, broth, and cocktail [13]		Total	
	Cases	*Value*	*Cases*	*Value*
Soft clams:				
Maine and Massachusetts	15,875	$24,595	200,732	$670,135
Hard clams:				
Maryland			42,795	84,961
Washington	5,224	11,329	59,296	264,403
Massachusetts, Rhode Island, New York, New Jersey, Pennsylvania and Florida	[17] 15,095	[17] 70,169	385,825	1,427,122
Total	20,319	81,498	487,916	1,776,486
Razor clams:				
Washington			38,509	319,725
Oregon	120	476	1,168	8,064
Alaska			26,009	201,887
Total	120	476	65,686	529,676
Grand total	36,314	106,569	754,334	2,976,297

[13] Consists of juice from soft clams in Maine; juice from hard clams in New York, Florida, and Washington; broth from hard and coquina clams in Florida; bouillon and cocktail from hard clams in New York; and juice from razor clams in Oregon.

[14] Packed in Maine.

[15] A small pack of whole hard clams in New York and Florida, and clams steamed in shell in Washington have been included with the Washington production.

[16] Packed in New York, New Jersey, and Florida.

[17] Includes a small amount of coquina broth packed in Florida.

Canned fishery products and byproducts of the United States and Alaska, 1936—Con.

PACK OF CANNED CLAMS AND CLAM PRODUCTS: ACTUAL CASES

Product and size	Whole		Minced		Chowder	
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*
Soft clams:						
No. 1 (48 cans)	82,304	$290,625				
1-pound (24 cans)					21,394	$75,116
1-pound (48 cans)	8,122	48,103				
No. 2 (24 cans)	9,036	29,576			2,628	7,770
No. 10 (6 cans)					3,153	10,671
Other sizes (standard cases)	1,337	5,469			55,422	178,210
Total		373,773				271,767
Hard clams:						
¼-pound (48 cans)						
½-pound (48 cans)			24,415	$87,894		
½-pound (96 cans)	17	272				
No. 1 (48 cans)	1,941	16,215	3,334	16,028	208,402	689,122
1-pound (12 cans)					282,165	477,713
1-pound (48 cans)	4,223	29,068	102	1,017	125	700
No. 2 (24 cans)	4,168	24,876	1,391	8,638		
No. 10 (6 cans)	11,712	56,420	4,920	39,160	6,644	21,871
Other sizes (standard cases)	2,106	17,689	1,515	9,101	75,102	199,204
Total		144,540		161,838		1,388,610
Razor clams:						
½-pound (48 cans)			61,753	400,244		
No. 1 (48 cans)	2,817	25,799	12,108	94,399		
1-pound (48 cans)	584	6,602	115	1,136		
No. 2 (24 cans)						
Other sizes (standard cases)			120	1,020		
Total		32,401		496,799		
Grand total		550,714		658,637		1,660,377

Product and size	Juice, bouillon, broth, and cocktail		Total	
	Cases	*Value*	*Cases*	*Value*
Soft clams:				
No. 1 (48 cans)	1,050	$1,620	83,354	$292,245
1-pound (24 cans)			21,394	75,116
1-pound (48 cans)			8,122	48,103
No. 2 (24 cans)	10,604	15,212	22,268	52,558
No. 10 (6 cans)			3,153	10,671
Other sizes (standard cases)	4,221	7,763	60,980	191,442
Total		24,595		670,135
Hard clams:				
¼-pound (48 cans)	1,558	6,674	1,558	6,674
½-pound (48 cans)			24,415	87,894
½-pound (96 cans)	78	565	95	837
No. 1 (48 cans)	836	2,812	214,513	724,177
1-pound (12 cans)			282,165	477,713
1-pound (48 cans)	360	1,507	4,810	32,292
No. 2 (24 cans)	2,578	7,997	8,137	41,511
No. 10 (6 cans)	5,122	18,406	28,398	135,857
Other sizes (standard cases)	9,051	43,537	87,774	269,531
Total		81,498		1,776,486
Razor clams:				
½-pound (48 cans)			61,753	400,244
No. 1 (48 cans)	100	400	15,025	120,598
1-pound (48 cans)			699	7,738
No. 2 (24 cans)	20	76	20	76
Other sizes (standard cases)			120	1,020
Total		476		529,676
Grand total		106,569		2,976,297

NOTE.—"Standard cases" represents the various sized cases converted to the equivalent of 48 No. 1 cans. Soft clam products were canned at 19 plants in Maine, and 2 plants in Massachusetts; hard clam products, at 2 plants in Massachusetts, 1 in Rhode Island, 2 in New York, 2 in New Jersey, 1 in Pennsylvania, 3 in Maryland, 1 in Florida, and 9 in Washington; razor clam products, at 4 plants in Washington, 3 in Oregon, and 10 in Alaska; and coquina clam products, at 1 plant in Florida.

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PACK OF CANNED SHRIMP: STANDARD CASES

State	Dry pack (in tins)		Wet pack (in tins)		Wet pack (in glass)		Total	
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*	*Cases*	*Value*
Georgia	16,496	$85,663	100,340	$494,842	29,884	$237,592	146,720	$818,097
Florida	5,487	26,027	37,807	190,454	10,778	86,825	54,072	303,306
Alabama and Texas	14,530	72,603	57,619	275,128	[18] 19,876	[18] 150,263	92,025	497,994
Mississippi	49,953	249,370	168,241	809,202			218,194	1,058,572
Louisiana	117,959	588,522	288,470	1,405,707	([18])	([18])	406,429	1,994,229
Total	204,425	1,022,185	652,477	3,175,333	60,538	474,680	917,440	4,672,198

PACK OF CANNED SHRIMP: ACTUAL CASES

Size	Cases	Value	Size	Cases	Value
In tins, dry:			In glass, wet:		
4-ounce (48 cans)	5,728	$26,026	2½-ounce (48 cans)	33,321	$142,223
5-ounce (48 cans)	182,450	903,225	4-ounce (24 cans)	8,870	27,205
8¼-ounce (24 cans)	20,114	92,934	5¾-ounce (24 cans)	26,907	75,449
In tins, wet:			6-ounce (24 cans)	56,570	229,803
5¾-ounce (48 cans)	650,593	3,165,210			
9¾-ounce (24 cans)	2,222	10,123	Total	986,775	4,672,198

[18] The pack of shrimp in glass for Louisiana has been included with that of Alabama and Texas.

NOTE.—"Standard cases" represents the various sized cans converted to the equivalent of 48 5-ounce cans to the case in the dry pack and 48 5¾-ounce cans to the case in the wet pack. Shrimp were canned at 6 plants in Georgia, 7 in Florida, 2 in Alabama, 17 in Mississippi, 26 in Louisiana, and 3 in Texas.

PACK OF MISCELLANEOUS CANNED FISHERY PRODUCTS: STANDARD CASES

Product	Atlantic and Gulf coasts [19]		Pacific coast (including Alaska)		Total	
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*
Shad			17,345	$46,805	17,345	$46,805
Shad roe			3,604	113,087	3,604	113,087
Fish flakes [20]	27,210	$234,091			27,210	234,091
Fish cakes, balls, etc.	88,926	641,268			88,926	641,268
Cat and dog food	45,289	87,265	222,136	656,703	267,425	743,968
Sturgeon caviar	3,112	426,254			3,112	426,254
Whitefish roe and caviar	1,867	54,358			1,867	54,358
Salmon roe and caviar (for food)	2,149	44,997			2,149	44,997
Salmon eggs (for bait)			2,992	60,670	2,992	60,670
Miscellaneous fish and roe [21]	19,471	256,200	595	7,150	20,066	263,350
Crabs	([22])	([22])	[22] 7,300	[22] 130,753	7,300	130,753
Oyster soup	[23] 35,430	[23] 181,201	([23])	([23])	35,430	181,201
Squid			8,068	30,708	8,068	30,708
Turtle products	4,129	68,500			4,129	68,500
Miscellaneous shellfish, etc. [24]	5,598	41,486			5,598	41,486
Total	233,181	2,035,620	262,040	1,045,876	495,221	3,081,496

[19] Includes the production of whitefish caviar by one firm in Wisconsin.

[20] Tuna flakes are not included in this table, but are included in the table for canned tuna and tunalike fishes.

[21] Includes Alaska salted cod, pickled eels, finnan haddie, fish bouillon, fish chowder, fish paste, fish prepared for poisoning rats, smoked salmon, salmon pudding (Norwegian style), kippered sturgeon, and groundfish roe.

[22] The production of one firm in Virginia is included with the Pacific coast.

[23] The production of three firms in Washington is included with the Atlantic coast.

[24] Includes clam cakes, crab and shrimp gumbo, fresh-water crayfish, frogs and frogs' legs, pickled mussels, shrimp soup, and terrapin products.

NOTE.—"Standard cases" represents the various sized cases converted to the equivalent of 48 1-pound cans to the case. Shad were canned at 10 plants; shad roe, at 8 plants; fish flakes, at 3 plants; fish cakes, balls, etc., at 6 plants; cat and dog food, at 8 plants; sturgeon caviar, at 5 plants; whitefish roe and caviar, at 5 plants; salmon roe and caviar (for food), at 4 plants; salmon eggs (for bait), at 8 plants; miscellaneous fish and roe, at 13 plants; crabs, at 14 plants; oyster soup, at 5 plants; squid, at 3 plants; turtle products, at 4 plants; and miscellaneous shellfish, etc., at 12 plants.

Canned fishery products and byproducts of the United States and Alaska, 1936—Con.

PRODUCTION OF OYSTER AND MARINE CLAM-SHELL PRODUCTS [25]

State	Crushed shell for poultry feed		Shell lime		Total	
	Tons	*Value*	*Tons*	*Value*	*Tons*	*Value*
Rhode Island and Delaware	1,529	$12,247	490	$2,164	2,019	$14,411
New Jersey	6,428	47,317	2,102	9,003	8,530	56,320
Pennsylvania	4,532	39,678	1,220	5,086	5,752	44,764
Maryland	45,137	193,288	25,300	36,920	70,437	230,208
Virginia	26,452	136,369	[26] 31,943	[26] 194,513	58,395	330,882
North Carolina, South Carolina, and Florida	54,556	250,645	8,633	27,881	63,189	278,526
Alabama, Louisiana, and Texas	127,117	397,030	7,346	22,479	134,463	419,509
Mississippi	17,060	67,279	2,220	1,933	19,280	69,212
Washington and Oregon	4,088	41,976	[27] 2,902	[27] 18,296	6,990	60,272
California	14,648	74,004	([27])	([27])	14,648	74,004
Total	301,547	1,259,833	82,156	318,275	383,703	1,578,108

[25] The production of marine clam-shell products was confined to Washington and California.
[26] Of this amount, 9,802 tons, valued at $72,134 were reported as "burned" lime.
[27] The production of oyster-shell lime in California has been included with that of Washington and Oregon.

NOTE.—The above crushed shell products were prepared at 2 plants in Rhode Island, 8 in New Jersey, 4 in Pennsylvania, 1 in Delaware, 4 in Maryland, 9 in Virginia, 2 in North Carolina, 2 in South Carolina, 2 in Florida, 2 in Alabama, 3 in Mississippi, 1 in Louisiana, 2 in Texas, 6 in Washington, 1 in Oregon, and 5 in California.

PRODUCTION OF FRESH-WATER MUSSEL-SHELL PRODUCTS

Item	Iowa, Wisconsin, and Missouri		New York		Total	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Pearl buttons—gross	14,591,680	$3,666,873	3,429,131	$954,498	18,020,811	$4,621,371
Crushed shell for poultry feed—tons	4,723	25,744			4,723	25,744
Lime—do	1,966	1,736			1,966	1,736
Other products [28]		61,409				61,409
Total		3,755,762		954,498		4,710,260

[28] Includes stucco and "pearl novelties."

NOTE.—Mussel shells purchased by manufacturing plants during the year amounted to 58,484,000 pounds, valued at $891,677. Shells were purchased from 18 States in the Mississippi River Valley and Great Lakes region. The producing States in order of their importance were Arkansas, which contributed 35 percent of the total quantity; Illinois, 14 percent; Tennessee and Indiana, each 12 percent; Kentucky, 7 percent; Iowa, 4 percent; Michigan and Wisconsin, each 3 percent; Ohio and Mississippi, each 2 percent; Texas and South Dakota, each 1 percent; and Alabama, Kansas, Oklahoma, Missouri, Minnesota, and Louisiana, each less than 1 percent.

PRODUCTION OF MARINE PEARL-SHELL PRODUCTS [29]

Item	Massachusetts, Rhode Island, and Connecticut		New York		New Jersey	
	Gross	*Value*	*Gross*	*Value*	*Gross*	*Value*
Pearl buttons	1,651,203	$1,056,219	405,978	$309,171	1,542,264	$1,104,134
Novelties [30]		214,500		87,250		125,082
Total		1,270,719		396,421		1,229,216

Item	Maine, Pennsylvania, Maryland, and Florida		Oregon and California		Total	
	Gross	*Value*	*Gross*	*Value*	*Gross*	*Value*
Pearl buttons	2,165,379	$1,096,220			5,764,824	$3,565,744
Novelties [30]		191,824		$81,586		700,242
Total		1,288,044		81,586		4,265,986

[29] Produced principally from imported shells.
[30] Includes knife handles, handles for manicure sets, dolls, lamps, mounted fish decoys, etc.

NOTE.—Marine pearl-shell products were manufactured at 1 plant in Maine, 2 in Massachusetts, 1 in Rhode Island, 6 in Connecticut, 9 in New York, 19 in New Jersey, 1 in Pennsylvania, 1 in Maryland, 2 in Florida, 1 in Oregon, and 2 in California.

Canned fishery products and byproducts of the United States and Alaska, 1936—Con.

FISH UTILIZED AND PRODUCTS OF THE MENHADEN INDUSTRY

State	Menhaden utilized	Products						
		Dry scrap and meal		Acidulated scrap		Oil		Total
	Number	*Tons*	*Value*	*Tons*	*Value*	*Gallons*	*Value*	*Value*
New York, New Jersey, Delaware, and Georgia	152,636,000	5,424	$175,180	9,590	$143,067	1,179,378	$308,132	$626,379
Virginia	288,537,000	21,242	748,165	----------	--------	2,784,223	696,101	1,444,266
North Carolina	142,741,000	5,804	191,161	8,961	138,746	666,454	184,202	514,109
Florida	186,391,000	9,941	297,204	4,931	77,802	250,824	61,273	436,279
Total	[31] 770,305,000	[32] 42,411	[32] 1,411,710	23,482	359,615	4,880,879	1,249,708	3,021,033

[31] 463,291,000 pounds.
[32] Of this production 34,834 tons, valued at $1,148,416, were reported as dry scrap and 7,577 tons, valued at $263,294, as fish meal.

NOTE.—The menhaden factories were located as follows: 1 in New York, 2 in New Jersey, 2 in Delaware, 10 in Virginia, 8 in North Carolina, 1 in Georgia, and 5 in Florida.

PRODUCTION OF MISCELLANEOUS BYPRODUCTS

Product	Atlantic and Gulf coasts [33]		Pacific coast (including Alaska)		Total	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Dried scrap:						
Alewife, tons	557	$16,502	----------	----------	557	$16,502
Blue crab, do	1,644	32,650	----------	----------	1,644	32,650
King crab, do	603	21,515	----------	----------	603	21,515
Miscellaneous [34], do	1,594	36,191	----------	----------	1,594	36,191
Meal:						
Groundfish "white fish", do	14,188	619,900	----------	----------	14,188	619,900
Herring (Alaska), do	----------	----------	14,193	$522,014	14,193	522,014
Herring (Maine), do	2,587	71,343	----------	----------	2,587	71,343
Mackerel, do	----------	----------	3,025	90,254	3,025	90,254
Pilchard, do	----------	----------	121,739	3,968,305	121,739	3,968,305
Salmon, do	----------	----------	1,657	55,128	1,657	55,128
Tuna, do	----------	----------	8,822	269,155	8,822	269,155
Shrimp, do	1,512	29,783	384	7,688	1,896	37,471
Whale (meat), do	----------	----------	789	28,404	789	28,404
Whale (bone), do	----------	----------	395	9,480	395	9,480
Miscellaneous [35], do	2,613	100,977	1,583	45,784	4,196	146,761
Oil:						
Alewife, gallons	6,550	1,363	----------	----------	6,550	1,363
Cod, do	17,542	7,049	----------	----------	17,542	7,049
Cod liver, do	281,374	170,779	----------	----------	281,374	170,779
Fur seal, do	----------	----------	23,669	7,229	23,669	7,229
Herring (Alaska), do	----------	----------	3,736,173	946,393	3,736,173	946,393
Herring (Maine), do	60,413	8,313	----------	----------	60,413	8,313
Mackerel, do	----------	----------	191,753	63,454	191,753	63,454
Pilchard, do	----------	----------	26,131,439	8,336,079	26,131,439	8,336,079
Salmon [36], do	----------	----------	145,992	59,301	145,992	59,301
Shark, do	1,250	286	----------	----------	1,250	286
Shark liver, do	----------	----------	2,860	1,010	2,860	1,010
Tuna, do	----------	----------	166,161	34,767	166,161	34,767
Whale:						
Sperm, do	1,848	370	199,450	48,772	201,298	49,142
Other, do	3,139,968	1,360,662	813,700	297,757	3,953,668	1,658,419
Liver (other than cod and shark) [37], gallons	26,526	1,099,266	40,640	1,625,600	67,166	2,724,866
Miscellaneous [38], do	30,031	9,228	3,600	1,080	33,631	10,308
Liquid glue [39], do	[39] 433,412	[39] 902,264	([39])	([39])	433,412	902,264
Shark fins, pounds	4,412	2,043	----------	----------	4,412	2,043
Miscellaneous byproducts [40]	----------	101,579	----------	383,880	----------	485,459
Total	----------	4,592,063	----------	16,801,534	----------	21,393,597

[33] Includes the production of burbot-liver oil in Minnesota and Wisconsin.
[34] Includes groundfish, herring, and miscellaneous acid and dry scrap.
[35] Includes salmon-egg, abalone, clam and miscellaneous meals, and cod-liver pressings.
[36] Includes a considerable production of salmon oil especially prepared for human consumption.
[37] Includes burbot, halibut, "lingcod," sablefish, swordfish, totuava, and tuna-liver oils.
[38] Includes rosefish and miscellaneous fish oils.
[39] A quantity of liquid glue produced by one firm in California is included with the production of liquid glue of the Atlantic and Gulf coasts.
[40] Includes isinglass, shark skins, kelp products, and pearl essence.

FROZEN-FISH TRADE [3]

FISH FROZEN

During 1936 the freezing plants which reported their activities to the Government froze 179,273,698 pounds of fishery products. These products at the time they were held in cold storage plants, were estimated to be valued at about $15,000,000. Compared with the output in 1935 this was an increase of 20 percent in volume. Five species or groups of species accounted for 64 percent of the total amount frozen. In the order of their importance they were cod, haddock, hake, and pollock (including cod, haddock, and pollock fillets), which accounted for 27 percent of the total; whiting, 16 percent; halibut, 9 percent; salmon, 7 percent; and mackerel, 5 percent. Other products frozen in considerable quantities during the year were sea herring and shellfish.

Production of frozen fishery products, 1936

BY SPECIES AND MONTHS

Species	Month ended the 15th of—						
	January	February	March	April	May	June	July
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Bluefish (all trade sizes)	115,794	4,239	7,419	7,742	102,555	84,247	34,048
Butterfish (all trade sizes)	4,851	14,524	2,645	27,279	23,885	166,840	64,648
Catfish	61,593	12,397	21,698	126,147	98,647	76,877	22,297
Cisco (Lake Erie)	889	----------	172	----------	570	14,698	23,312
Cisco (lake herring), including bluefin, blackfin, and chub	392,143	17,608	6,065	6,011	19,928	85,363	188,674
Cisco (tullibees, Canadian lakes)	1,865	6,036	10,567	1,300	----------	8,607	1,950
Cod, haddock, hake, and pollock (except fillets of cod, haddock, and pollock)	1,065,906	263,309	603,056	1,504,491	2,172,937	1,426,592	292,687
Cod fillets	(1)	(1)	(1)	(1)	(1)	(1)	80,935
Croaker	5,231	291	83,682	510,070	968,545	251,873	59,031
Flounders	54,491	53,665	44,787	62,226	96,761	116,163	21,079
Haddock fillets	893,198	914,400	2,278,505	2,959,298	2,790,663	2,183,681	2,167,172
Halibut (all trade sizes)	429,744	----------	----------	1,198,868	2,275,163	2,713,330	2,919,198
Herring, sea (including alewives and bluebacks)	34,934	55,885	78,175	443,128	760,299	725,426	169,239
Lake trout	12,229	4,559	18,297	9,068	45,075	65,097	66,714
Mackerel (except Spanish)	40,492	73,952	21,983	31,425	1,496,219	2,287,015	3,159,172
Perch, yellow	595	----------	1,492	370	5,095	6,908	9,055
Pike, blue and sauger	49,800	39,704	38,926	12,881	207,731	301,912	52,536
Pike, yellow or wall-eyed	429	20,184	91,713	28,374	103,596	22,875	5,039
Pike (including pickerel, jacks, and yellow jack)	2,439	2,651	15,550	6,732	10,129	12,224	14,847
Pollock fillets	(1)	(1)	(1)	(1)	(1)	(1)	4,930
Sablefish (black cod)	46,807	91,848	20,732	9,916	12,997	57,942	110,095
Salmon, chinook or king	5,470	17,953	9,282	46,239	98,756	446,791	795,501
Salmon, silver or coho	24,147	101,144	22,548	19,984	26,137	24,172	278,421
Salmon, fall and pink	39,843	13,731	14,628	17,875	7,994	1,484	21,964
Salmon, steelhead trout	7,345	21,487	54,341	7,287	10,707	10,512	186,704
Scup (porgies)	1,826	322	----------	18,453	121,847	372,505	201,671
Shad and shad roe	2,778	3,190	7,555	10,701	207,274	63,490	185,856
Shellfish	415,993	362,408	227,425	148,590	273,000	966,971	728,479
Smelts, eulachon, etc	22,879	146,660	173,537	395,643	697,180	21,324	32,940
Squid	7,850	24,980	400	1,854	363,753	756,521	203,357
Sturgeon and spoonbill cat	1,013	2,624	248	833	41,743	39,696	12,134
Suckers	1,150	2,432	2,389	1,870	59,581	24,083	17,747
Swordfish	25,563	20,348	1,193	18,031	3,898	644	9,399
Weakfish (including southern "sea trout")	----------	3,343	711	2,425	243,006	213,813	56,883
Whitefish	7,542	94,866	175,790	1,035	13,302	6,950	103,063
Whiting	84,409	57,142	76,888	50,198	557,996	5,527,179	8,061,735
Miscellaneous fish	978,277	679,416	1,025,927	1,886,850	3,219,716	2,599,509	2,281,766
Total	4,839,515	3,127,298	5,138,326	9,573,194	17,136,685	21,683,314	22,644,278

[1] Prior to July 15, 1936, this item was included with "Cod, haddock, hake, and pollock."

[3] The statistics in this section have been furnished by the Bureau of Agricultural Economics, Department of Agriculture.

Production of frozen fishery products, 1936—Continued

BY SPECIES AND MONTHS—Continued

Species	Month ended the 15th of—					
	August	September	October	November	December	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Bluefish (all trade sizes)	1,005,237	172,559	113,145	69,773	29,248	1,746,006
Butterfish (all trade sizes)	69,090	243,608	184,809	216,988	193,675	1,212,842
Catfish	21,795	18,639	34,929	31,516	39,376	565,911
Cisco (Lake Erie)	34,710	12,551	20,340	1,745	46,286	155,273
Cisco (lake herring), including bluefin, blackfin, and chub	239,147	220,780	239,979	1,089,413	1,289,270	3,794,381
Cisco (tullibees, Canadian lakes)	14,405	2,837	1,300	10	759	49,636
Cod, haddock, hake, and pollock (except fillets of cod, haddock, and pollock)	1,020,650	1,059,380	1,219,052	1,256,700	1,349,579	13,234,339
Cod fillets	961,875	590,991	622,396	387,793	481,857	3,125,847
Croaker	240,153	300,821	12,769	47,327	23,247	2,503,040
Flounders	33,671	40,054	105,675	79,902	87,537	796,011
Haddock fillets	2,360,099	2,547,235	2,488,600	1,318,393	911,735	23,812,979
Halibut (all trade sizes)	3,075,179	954,185	811,866	1,365,481	----------	15,743,014
Herring, sea (including alewives and bluebacks)	193,110	211,811	919,863	1,413,562	412,696	5,418,128
Lake trout	53,881	64,137	161,789	277,552	145,860	924,258
Mackerel (except Spanish)	1,004,541	653,013	464,446	362,845	128,857	9,723,960
Perch, yellow	7,792	17,641	34,538	59,631	30,940	174,057
Pike, blue and sauger	24,407	5,181	86,936	289,213	102,044	1,211,271
Pike, yellow or wall-eyed	5,263	9,830	18,018	4,095	28,975	338,391
Pike (including pickerel, jacks, and yellow jack)	10,175	12,972	14,032	18,805	26,534	147,090
Pollock fillets	518,157	535,515	986,933	3,168,518	3,049,098	8,263,151
Sablefish (black cod)	235,203	468,993	530,509	661,774	322,986	2,569,802
Salmon, chinook or king	956,013	587,208	1,356,462	250,876	78,292	4,648,843
Salmon, silver or coho	1,308,701	1,382,126	783,020	224,794	86,861	4,282,055
Salmon, fall and pink	308,330	186,349	908,182	1,751,425	154,980	3,426,785
Salmon, steelhead trout	365,596	140,449	35,753	7,988	12,169	860,338
Scup (porgies)	39,362	109,068	18,996	3,608	3,212	890,870
Shad and shad roe	63,368	6,083	1,639	17,475	26,514	595,923
Shellfish	544,783	854,483	1,521,843	1,420,111	1,155,775	8,619,861
Smelts, eulachon, etc	29,895	27,186	50,910	96,365	132,010	1,826,529
Squid	273,606	125,629	57,574	64,381	8,142	1,888,047
Sturgeon and spoonbill cat	12,268	25,602	112,563	83,852	37,420	369,996
Suckers	9,625	15,100	7,914	3,164	3,639	148,694
Swordfish	388,202	46,868	59,000	45,037	27,587	645,770
Weakfish (including southern "sea trout")	181,340	346,015	62,299	58,418	35,350	1,203,603
Whitefish	39,050	29,043	49,304	45,915	46,957	612,817
Whiting	5,538,161	3,923,554	1,497,049	1,116,710	1,065,296	27,556,317
Miscellaneous fish	1,958,162	1,804,221	2,967,999	3,218,056	3,567,964	26,187,863
Total	23,145,002	17,751,717	18,562,431	20,529,211	15,142,727	179,273,698

BY GEOGRAPHICAL SECTIONS AND SPECIES[2]

[Expressed in thousands of pounds; that is, 000 omitted]

Species	New England	Middle Atlantic	South Atlantic	North Central, East	North Central, West	South Central	Pacific	Total
Bluefish (all trade sizes)	75	1,520	9	134	1	7	--------	1,746
Butterfish (all trade sizes)	242	965	6	--------	--------	--------	--------	1,213
Catfish	199	7	101	50	163	46	--------	566
Cisco (Lake Erie)	--------	151	--------	4	--------	--------	--------	155
Cisco (lake herring), including bluefin, blackfin, and chub	18	736	--------	2,243	797	--------	--------	3,794
Cisco (tullibees, Canadian lakes)	30	2	--------	7	11	--------	--------	50
Cod, haddock, hake, and pollock (except fillets of cod, haddock, and pollock)	11,635	233	9	213	8	905	231	13,234
Cod fillets[1]	3,069	5	--------	36	13	--------	3	3,126

[1] Prior to July 15, 1936, this item was included with "Cod, haddock, hake, and pollock."

[2] New England includes the 6 States of that section; Middle Atlantic—New York, New Jersey, and Pennsylvania; South Atlantic—Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida; North Central, East—Ohio, Indiana, Illinois, Michigan, and Wisconsin; North Central, West—Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas; South Central—Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Texas, Oklahoma, and Arkansas; and Pacific—Washington, Oregon, California, and Alaska.

Production of frozen fishery products, 1936—Continued

BY GEOGRAPHICAL SECTIONS AND SPECIES—Continued

[Expressed in thousands of pounds; that is, 000 omitted]

Species	New England	Middle Atlantic	South Atlantic	North Central, East	North Central, West	South Central	Pacific	Total
Croakers		411	1,937	141		14		2,503
Flounders	180	548	2	8		2	56	796
Haddock fillets	23,049	77	30	634	22		1	23,813
Halibut (all trade sizes)	269	275	8	453	58	15	14,665	15,743
Herring, sea (including alewives and bluebacks)	3,176	218	33	891	9	4	1,087	5,418
Lake trout	8	185	31	606	85	9		924
Mackerel (except Spanish)	7,086	2,196	12	211	1	3	215	9,724
Perch, yellow		12	9	146	4		3	174
Pike, blue and sauger		258		951	2			1,211
Pike, yellow or wall-eyed		184		59	95			338
Pike (including pickerel, jacks, and yellow jack)		20		62	65			147
Pollock fillets [1]	8,262				1			8,263
Sablefish (black cod)		1		92	9		2,468	2,570
Salmon, chinook or king	52	83	12	17	43		4,442	4,649
Salmon, silver or coho	50	111	9	29	34	5	4,044	4,282
Salmon, fall and pink		4	6	52	24	5	3,336	3,427
Salmon, steelhead trout		17	1				842	860
Scup (porgies)	116	773		2				891
Shad and shad roe	276	228	5	38		6	43	596
Shellfish	950	2,309	381	845	419	2,285	1,431	8,620
Smelts, eulachon, etc	38	499	35	1,137	5	1	112	1,827
Squid	1,461	414	1	2			10	1,888
Sturgeon and spoonbill cat		340		11	8	6	5	370
Suckers	2	2	22	123				149
Swordfish	403	5	3	18			217	646
Weakfish (including southern "sea trout")		1,018	186					1,204
Whitefish	3	469	1	103	28	6	3	613
Whiting	24,516	2,273	5	225	61	476		27,556
Miscellaneous frozen fish	11,008	3,519	2,937	3,459	693	1,207	3,365	26,188
Total	96,173	20,068	5,791	13,002	2,659	5,002	36,579	179,274

[1] Prior to July 15, 1936, this item was included with "Cod, haddock, hake, and pollock."

BY GEOGRAPHICAL SECTIONS AND MONTHS [2]

[Expressed in thousands of pounds; that is, 000 omitted]

Month ended the 15th of—	New England	Middle Atlantic	South Atlantic	North Central, East	North Central, West	South Central	Pacific	Total
January	2,173	600	227	589	189	123	939	4,840
February	1,103	708	91	377	64	146	638	3,127
March	3,156	627	232	403	112	124	484	5,138
April	5,323	265	1,060	834	155	167	1,769	9,573
May	7,975	2,482	1,515	1,812	244	184	2,925	17,137
June	13,029	2,251	298	1,680	116	586	3,723	21,683
July	15,167	1,493	87	815	142	329	4,611	22,644
August	13,222	2,204	309	630	159	309	6,312	23,145
September	10,081	1,720	397	666	142	576	4,170	17,752
October	9,121	2,205	53	1,016	272	869	5,026	18,563
November	8,731	2,550	418	2,367	489	943	5,031	20,529
December	7,092	2,963	1,104	1,813	575	646	950	15,143
Total	96,173	20,068	5,791	13,002	2,659	5,002	36,579	179,274

[2] New England includes the 6 States of that section: Middle Atlantic—New York, New Jersey, and Pennsylvania; South Atlantic—Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida; North Central, East—Ohio, Indiana, Illinois, Michigan, and Wisconsin; North Central, West—Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas; South Central—Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Texas, Oklahoma, and Arkansas; and Pacific—Washington, Oregon, California, and Alaska.

HOLDINGS

During 1936 monthly holdings of frozen fish and shellfish averaged 61,990,000 pounds, which is an increase of 19 percent as compared with the average monthly holdings in 1935. The largest supplies were in storage in December when 94,695,000 pounds were on hand and the smallest quantity was in storage in April when 26,102,000 pounds were held. The holdings during each of the months from September to December exceeded 84,000,000 pounds.

Holdings of frozen fishery products, 1936

BY SPECIES AND MONTHS

Species	Month ended the 15th of—					
	January	February	March	April	May	June
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Bluefish (all trade sizes)	459,595	292,023	158,241	75,203	145,080	129,901
Butterfish (all trade sizes)	365,229	244,806	170,371	118,959	114,305	244,343
Catfish	468,847	419,513	201,391	137,582	206,547	243,394
Cisco (Lake Erie)	37,556	34,569	14,693	298	1,425	12,495
Cisco (lake herring), including bluefin, blackfin, and chub	1,411,301	746,369	265,359	78,673	61,877	148,959
Cisco (tullibees, Canadian lakes)	387,085	413,611	349,116	198,272	91,895	39,529
Cod, haddock, hake, and pollock (except fillets of cod, haddock, and pollock)	4,675,755	2,421,050	829,335	1,269,739	2,341,272	2,709,534
Cod fillets	(1)	(1)	(1)	(1)	(1)	(1)
Croaker	299,536	112,220	71,958	553,539	1,520,896	1,582,253
Flounders	290,875	166,041	211,343	200,250	260,306	354,529
Haddock fillets	5,226,716	3,340,546	2,706,052	3,434,875	4,213,612	4,540,207
Halibut (all trade sizes)	6,186,132	3,856,080	1,936,747	2,193,366	4,318,163	6,573,973
Herring, sea (including alewives and blue-backs)	2,634,743	1,905,490	1,408,415	1,303,996	1,600,908	1,906,102
Lake trout	516,259	283,568	144,145	53,164	80,426	133,337
Mackerel (except Spanish)	6,014,158	4,032,790	1,916,326	633,102	1,915,980	3,719,478
Perch, yellow	97,941	48,186	23,169	14,562	18,045	23,764
Pike, blue and sauger	605,956	600,553	601,569	253,074	413,617	600,116
Pike, yellow or wall-eyed	173,346	283,165	392,210	371,636	430,794	363,981
Pike (including pickerel, jacks, and yellow jack)	195,144	226,763	260,241	233,471	207,785	190,974
Pollock fillets	(1)	(1)	(1)	(1)	(1)	(1)
Sablefish (black cod)	1,823,080	1,297,705	964,974	695,747	523,534	432,496
Salmon, chinook or king	3,365,799	2,832,548	2,240,485	1,702,157	1,489,050	1,683,521
Salmon, silver or coho	5,588,934	3,899,030	2,629,272	1,755,506	1,198,142	972,532
Salmon, fall and pink	3,192,605	2,207,476	1,418,093	1,047,878	866,839	718,714
Salmon, steelhead trout	201,472	179,527	198,491	126,225	101,516	69,804
Scup (porgies)	62,730	29,735	14,487	23,007	145,755	514,909
Shad and shad roe	291,120	227,200	195,834	143,174	321,895	358,691
Shellfish	3,582,708	3,064,360	2,167,458	1,194,427	879,038	1,277,801
Smelts, eulachon, etc	668,650	921,323	1,583,690	1,741,944	2,151,044	2,087,295
Squid	1,459,774	1,177,396	839,069	399,420	587,177	1,317,566
Sturgeon and spoonbill cat	75,947	59,479	360,429	388,860	332,153	318,881
Suckers	155,864	144,757	113,811	64,095	121,079	121,839
Swordfish	951,266	773,644	427,274	188,800	147,206	35,906
Weakfish (including southern "sea trout")	299,518	154,994	51,590	27,678	226,697	394,062
Whitefish	774,747	907,041	892,220	594,977	317,524	212,448
Whiting	4,427,088	2,883,065	1,408,328	533,314	767,686	5,055,878
Miscellaneous fish	7,063,542	4,942,343	4,104,211	4,350,639	6,136,525	7,140,762
Total	64,031,018	45,128,966	31,270,397	26,101,609	34,255,793	46,229,974

[1] Prior to July 15, 1936, this item was included with "Cod, haddock, hake, and pollock."

Holdings of frozen fishery products, 1936—Continued

BY SPECIES AND MONTHS—Continued

Species	Month ended the 15th of—					
	July	August	September	October	November	December
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Bluefish (all trade sizes)	86, 373	1, 086, 199	1, 184, 282	1, 083, 597	981, 019	850, 360
Butterfish (all trade sizes)	253, 565	286, 929	482, 212	566, 372	662, 643	732, 562
Catfish	204, 734	194, 178	196, 423	260, 806	287, 836	340, 022
Cisco (Lake Erie)	30, 898	55, 635	60, 187	65, 167	49, 308	71, 415
Cisco (lake herring), including bluefin, blackfin, and chub	299, 151	494, 384	648, 008	848, 527	1, 613, 506	2, 487, 924
Cisco (tullibees, Canadian lakes)	37, 296	48, 667	49, 868	48, 258	28, 538	32, 924
Cod, haddock, hake, and pollock (except fillets of cod, haddock, and pollock)	2, 097, 835	1, 698, 780	1, 884, 790	2, 140, 246	2, 613, 878	3, 577, 156
Cod fillets	1, 194, 479	1, 789, 571	1, 585, 054	1, 561, 803	1, 378, 767	1, 561, 470
Croaker	1, 209, 119	1, 497, 338	1, 744, 736	1, 128, 055	1, 005, 671	746, 848
Flounders	313, 208	278, 573	281, 750	293, 569	327, 000	399, 445
Haddock fillets	6, 047, 069	7, 012, 803	8, 835, 909	9, 021, 726	7, 921, 391	6, 691, 817
Halibut (all trade sizes)	9, 130, 392	11, 941, 231	12, 199, 303	10, 945, 336	10, 378, 274	8, 887, 224
Herring, sea (including alewives and blueblacks)	1, 574, 328	1, 279, 667	1, 065, 181	1, 472, 956	2, 589, 547	2, 621, 891
Lake trout	210, 521	241, 875	301, 753	507, 727	804, 899	831, 095
Mackerel (except Spanish)	6, 706, 300	7, 429, 664	7, 638, 332	6, 582, 498	5, 724, 298	4, 936, 233
Perch, yellow	24, 757	26, 509	46, 108	75, 581	206, 234	186, 012
Pike, blue and sauger	392, 964	170, 745	70, 449	215, 463	557, 233	645, 253
Pike, yellow or wall-eyed	330, 922	253, 846	246, 518	254, 037	258, 753	270, 196
Pike (including pickerel, jacks, and yellow jack)	196, 875	176, 151	194, 183	209, 892	177, 635	172, 654
Pollock fillets	444, 386	756, 644	964, 086	1, 616, 699	4, 138, 690	5, 961, 511
Sablefish (black cod)	424, 943	530, 622	887, 214	1, 181, 035	1, 618, 952	1, 843, 766
Salmon, chinook or king	2, 189, 703	2, 774, 391	3, 074, 762	4, 065, 862	4, 063, 008	3, 830, 004
Salmon, silver or coho	1, 099, 268	2, 329, 242	3, 481, 988	3, 791, 394	3, 625, 217	3, 429, 031
Salmon, fall and pink	654, 451	816, 224	858, 406	1, 588, 927	2, 894, 784	2, 958, 833
Salmon, steelhead trout	245, 794	564, 507	651, 613	651, 420	655, 119	676, 787
Scup (porgies)	688, 871	724, 528	824, 736	781, 001	691, 983	572, 320
Shad and shad roe	557, 892	592, 138	581, 412	541, 526	509, 833	445, 502
Shellfish	1, 620, 490	1, 447, 472	1, 943, 643	2, 739, 945	3, 653, 553	3, 850, 147
Smelts, eulachon, etc	2, 065, 938	2, 021, 874	2, 046, 204	1, 884, 694	1, 915, 766	1, 635, 033
Squid	1, 352, 855	1, 369, 025	1, 139, 504	860, 767	883, 709	728, 318
Sturgeon and spoonbill cat	279, 143	284, 836	208, 028	275, 513	296, 095	130, 201
Suckers	138, 087	140, 588	139, 091	128, 041	123, 192	114, 582
Swordfish	39, 772	418, 448	430, 253	480, 142	589, 358	656, 796
Weakfish (including southern "sea trout")	405, 864	558, 158	874, 250	740, 342	689, 398	654, 356
Whitefish	303, 098	295, 763	424, 581	512, 523	511, 499	510, 196
Whiting	12, 117, 447	16, 474, 491	18, 590, 064	17, 426, 453	16, 686, 051	17, 091, 817
Miscellaneous fish	7, 581, 873	8, 014, 710	8, 862, 931	9, 597, 581	11, 589, 502	13, 562, 899
Total	62, 550, 661	76, 076, 407	84, 697, 812	86, 145, 392	92, 702, 139	94, 694, 600

BY GEOGRAPHICAL SECTIONS AND MONTHS [2]

[Expressed in thousands of pounds; that is, 000 omitted]

Month ended the 15th of—	New England	Middle Atlantic	South Atlantic	North Central, East	North Central, West	South Central	Pacific [3]	Total
January	20, 815	9, 014	1, 558	8, 336	4, 714	504	19, 090	64, 031
February	12, 620	7, 238	1, 236	7, 107	3, 996	286	12, 646	45, 129
March	7, 384	6, 833	867	5, 057	3, 044	98	7, 987	31, 270
April	6, 447	5, 150	1, 632	3, 644	2, 195	100	6, 934	26, 102
May	9, 926	6, 080	3, 112	4, 660	2, 127	187	8, 164	34. 256
June	17, 020	7, 260	3, 089	5, 708	2, 230	435	10, 488	46. 230
July	27, 919	8, 021	2, 606	6, 651	3, 280	425	13, 649	62, 551
August	32, 827	9, 493	3, 076	4, 918	4, 731	399	20, 632	76, 076
September	34, 981	10. 358	3, 368	8, 786	5, 680	584	20, 941	84, 698
October	34. 366	11, 013	2, 534	9. 170	6, 371	945	21, 746	86, 145
November	34, 120	12, 303	2, 686	12, 990	6, 746	1, 289	22, 568	92, 702
December	35, 293	13. 286	3, 342	13, 987	7, 171	1, 117	20, 499	94, 695
Average	22, 810	8, 837	2, 426	7, 584	4, 357	531	15, 445	61, 990

[2] New England includes the 6 States of that section; Middle Atlantic—New York, New Jersey, and Pennsylvania; South Atlantic—Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida; North Central, East—Ohio, Indiana, Illinois, Michigan, and Wisconsin; North Central, West—Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas; South Central—Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Texas, Oklahoma, and Arkansas; and Pacific—Washington, Oregon, California, and Alaska.

[3] Includes a small amount of fish held in Colorado in the Mountain section.

COLD-STORAGE HOLDINGS OF CURED FISH

During 1936 monthly cold-storage holdings of cured herring and mild-cured salmon averaged 21,499,000 pounds which is an increase of 67 percent as compared with the average monthly holdings in 1935. The holdings during October were the largest, amounting to 30,666,265 pounds, and the smallest were in February, amounting to 14,417,137 pounds.

Holdings of cured fish, 1936, by species and months

Month ended the 15th of—	Cured herring	Mild-cured salmon	Total
	Pounds	*Pounds*	*Pounds*
January	11,691,071	3,934,058	15,625,129
February	11,220,277	3,196,860	14,417,137
March	11,045,969	4,683,851	15,729,820
April	11,988,905	3,823,286	15,812,191
May	14,336,246	3,457,473	17,793,719
June	15,244,953	4,047,567	19,292,520
July	15,212,397	4,773,666	19,986,063
August	14,966,600	8,113,838	23,080,438
September	18,705,792	9,581,733	28,287,525
October	21,036,444	9,629,821	30,666,265
November	20,204,091	9,292,467	29,496,558
December	18,049,926	9,749,907	27,799,833

FOREIGN FISHERY TRADE

The foreign trade in fishery products of the United States in 1936 amounted to $55,086,726, of which $41,872,560 represents the value of these products imported for consumption, and $13,214,166, the value of exports of domestic fishery products. Compared with the previous year, there was an increase of 9 percent in total trade, and 16 percent in the value of the imports, but a decrease of 8 percent in the value of exports.

Imports consisted of 371,205,567 pounds of edible products, valued at $30,356,439, and nonedible products, valued at $11,516,121. Fishery exports consisted of 111,259,302 pounds of edible products, valued at $12,262,784, and nonedible products, valued at $951,382.

Import duties levied on fishery products imported during 1936 totaled $6,544,971.

Exports of domestic fishery products, 1936 [1]

Item	Quantity	Value
EDIBLE FISHERY PRODUCTS		
Fish, fresh, frozen, or packed in ice:		
Salmon—pounds	5,326,396	$523,764
Other—do	1,378,412	142,668
Total—do	6,704,808	666,432
Fish, salted, pickled, or dry cured:		
Cod, haddock, hake, pollock, and cusk—do	628,099	62,128
Salmon—do	1,996,168	347,600
Herring—do	1,191,128	61,459
Other—do	1,881,018	77,721
Total—do	5,696,413	548,908
Fish, smoked or kippered—do	276,917	34,658

[1] These statistics have been furnished by the Bureau of Foreign and Domestic Commerce, Department of Commerce.

Exports of domestic fishery products, 1936—Continued

Item		Quantity	Value
EDIBLE FISHERY PRODUCTS—continued			
Fish, canned:			
Mackerel	pounds	803,754	$45,648
Salmon	do	38,892,896	6,404,358
Sardines	do	42,688,741	2,530,867
Other	do	366,070	57,872
Total	do	82,751,461	9,038,745
Shellfish, not canned:			
Oysters, fresh, in the shell	do	3,998,408	134,369
Oysters, fresh, shucked, frozen, or in ice	do	1,656,130	240,261
Shrimp, fresh, frozen, or in ice	do	2,084,283	244,541
Shrimp, dried	do	1,494,473	258,221
Other shellfish, fresh, frozen, in ice, or dried	do	226,890	27,314
Total	do	9,460,184	904,706
Shellfish, canned:			
Shrimp	do	5,082,336	817,878
Other	do	1,084,959	173,787
Total	do	6,167,295	991,665
Other fish products	do	202,224	77,670
Total edible products	do	111,259,302	12,262,784
NONEDIBLE FISHERY PRODUCTS			
Marine-animal oils	pounds	2,154,242	327,952
Sponges	do	53,897	66,055
Fish meal for feed	tons	4,431	183,043
Oyster shells	do	58,961	374,332
Total nonedible products			951,382
Grand total			13,214,166

Imports of fishery products entered for consumption, 1936 [1]

Item	Pounds	Value
EDIBLE FISHERY PRODUCTS		
Fish, fresh or frozen:		
Whole or beheaded, or eviscerated, or both:		
Salmon	10,506,190	$820,301
Fresh-water fish, not elsewhere specified:		
Yellow pike	9,753,194	840,747
Whitefish	11,748,094	1,490,153
Tullibees	1,699,501	106,396
Jacks or grass pike	3,454,042	180,831
Lake trout	4,319,650	484,161
Yellow perch	1,795,509	153,830
Lake herring and ciscoes	1,872,841	198,398
Chubs	894,386	113,163
Mullets (*Catostomus*)	485,721	26,605
Saugers	4,637,560	273,608
Fresh-water fish, not elsewhere specified	9,177,699	562,387
Eels	504,042	28,958
Cod, haddock, hake, pollock, and cusk	3,439,552	150,855
Halibut:		
Fresh	4,170,284	382,464
Frozen	904,147	75,468
Mackerel	451,291	21,225
Swordfish:		
Fresh	1,870,828	371,942
Frozen	4,154,582	293,267
Sturgéon	1,109,817	189,484
Fish, not specially provided for	5,071,618	186,452
Whether or not whole:		
Smelts	8,611,650	848,271
Tuna fish	5,454,897	305,343

[1] These statistics have been furnished by the Bureau of Foreign and Domestic Commerce, Department of Commerce.

Imports of fishery products entered for consumption, 1936—Continued

Item	Pounds	Value
EDIBLE FISHERY PRODUCTS—continued		
Fish, fresh or frozen—Continued.		
Whether or not whole—Continued.		
Sea herring:		
Fresh	47,351,773	$317,122
Frozen	2,535,159	70,732
Fillets, skinned, boned, sliced, or divided, not specially provided for	9,255,303	893,646
Total	155,229,330	9,385,809
Fish, salted, dried, smoked, pickled, or preserved:		
Dried and unsalted:		
Cod, haddock, hake, pollock, and cusk	22,587	1,140
Other	3,339,720	370,533
In oil or in oil and other substances:		
Sardines	35,787,399	4,610,427
Anchovies	2,434,192	833,596
Antipasto	194,722	81,216
Tuna	6,843,487	1,098,549
Other	517,271	114,026
Not in oil or in oil and other substances:		
In airtight containers weighing, with contents, not over 15 pounds each:		
Anchovies	1,462,647	136,090
Salmon	2,323,828	150,270
Herring and sardines	12,880,711	994,155
Fish cakes, balls, and pudding	2,030,099	135,318
Other	1,234,027	137,426
Pickled or salted:		
Not in oil, etc., and not in airtight containers weighing, with contents, 15 pounds or less each:		
Salmon	265,113	29,460
Cod, haddock, hake, pollock, and cusk, neither skinned nor boned (except that vertebral column may be removed):		
Containing not more than 43 percent moisture by weight	3,152,214	160,428
Containing more than 43 percent moisture by weight	52,359,316	1,537,784
Cod, haddock, hake, pollock and cusk, skinned or boned	2,475,519	239,463
Herring, in bulk or in containers	37,671,529	1,815,700
Mackerel, in bulk or in containers weighing, with contents, more than 15 pounds each (net weight)	4,868,976	256,061
Alewives, in bulk or in containers weighing, with contents, more than 15 pounds each (net weight)	104,357	2,333
Pickled or salted, not specially provided for:		
In bulk or in containers weighing, with contents, more than 15 pounds each (net weight)	1,024,915	69,606
In containers (not airtight) weighing, with contents, not more than 15 pounds each	5,451	356
Smoked or kippered:		
Not in oil, etc., and not in airtight containers weighing, with contents, 15 pounds or less each:		
Salmon	34,474	10,717
Herring:		
Whole or beheaded	2,164,606	82,076
Eviscerated, split, skinned, boned, or divided	1,252,161	103,640
Cod, haddock, hake, pollock, and cusk:		
Whole, or beheaded, or eviscerated or both	930,854	92,960
Filleted, skinned, boned, sliced, or divided	1,830,688	182,028
Smoked or kippered, not specially provided for	18,443	1,160
Fish paste and fish sauce	124,629	35,298
Prepared or preserved, not specially provided for:		
In containers weighing, with contents, not more than 15 pounds each	22,680	2,238
In bulk or in containers weighing, with contents, more than 15 pounds each (net weight)	336,733	23,812
Total	177,713,348	13,307,866
Caviar and other fish roe:		
Not boiled, etc.:		
Sturgeon	309,053	330,430
Fish roe, not specially provided for	80,766	15,469
Boiled, packed in airtight containers	81,120	8,230
Total	470,939	354,129
Shellfish:		
Crab meat, crab sauce, and crab paste	9,018,724	2,927,547
Clams, clam juice, or either in combination with other substances, in airtight containers	1,019,849	218,744
Oysters, oyster juice, or either in combination with other substances in airtight containers	133,128	30,375

Imports of fishery products entered for consumption, 1936—Continued

Item	Pounds	Value
EDIBLE FISHERY PRODUCTS—continued		
Shellfish—Continued.		
Lobsters (including spiny lobsters and crawfish):		
Not canned	11,121,533	$2,487,211
Canned	864,915	470,822
Clams not in airtight containers	4,574,473	61,603
Shrimp and prawn	808,902	91,211
Scallops	2,652,575	394,936
Oysters, not in airtight containers	3,246,086	111,197
Shellfish, not specially provided for	3,513,431	451,137
Pastes and sauces of shellfish, not specially provided for	159,092	23,260
Crabs	8,855	1,193
Turtles	670,387	39,399
Total	37,791,950	7,308,635
Total edible fishery products	371,205,567	30,356,439
NONEDIBLE FISHERY PRODUCTS		
Marine-animal oils:	*Quantity*	
Cod oil—gallons	2,799,694	1,005,675
Cod-liver oil—do	5,789,574	3,546,733
Eulachon oil—do	493	249
Herring oil—do	4,295	982
Seal oil—do	556	216
Sod oil—do	67,521	21,273
Whale oil:		
Sperm, crude—do	1,364,412	327,675
Sperm, refined or otherwise processed—do	39,059	13,524
Whale oil, not specially provided for—do	2,342,598	493,764
Other marine-animal and fish oils—do	99,355	27,302
Total—do	12,507,557	5,437,393
Pearls and imitation pearls:		
Pearls and parts, not strung or set		743,738
Imitation pearls, half pearls and hollow or filled		22,244
Imitation pearl beads:		
Hollow or filled		39,952
Other solid imitation pearl beads:		
Valued at not more than ¼ cent per inch—inches	98,306,575	73,503
Valued at more than ¼, but not more than 1 cent per inch—do	620,438	3,569
Valued at more than 1, but not more than 5 cents per inch—do	2,376	33
Total		883,039
Shells and buttons of pearl or shell:		
Shells, unmanufactured:		
Green snail shell—pounds	284,470	51,347
Mother-of-pearl—do	9,349,360	2,010,899
Shells, not specially provided for—do	2,398,628	21,117
Shells and mother-of-pearl, engraved, cut, ornamented, or manufactured		38,325
Shell pearl buttons:		
Ocean—gross	474,904	126,736
Fresh water—do	143,520	33,645
Buttons (from Philippine Islands)—do	677,657	217,832
Buttons, blank, not turned, faced, or drilled—do	694	137
Total		2,500,038
Sponges:		
Sheepswool—pounds	195,100	314,257
Yellow, grass, or velvet—do	339,133	159,126
Other—do	70,722	87,466
Manufactures of—do	728	889
Total—do	605,683	561,738
Agar agar—do	625,309	274,688
Ambergris—do	63	6,878
Cod-liver oil cake and cod-liver oil cake meal—do	1,794,159	47,094
Cuttlefish bone—do	345,017	51,701
Goldfish, and other aquarium fish		52,464
Fish for other than human consumption, not elsewhere specified		14,140
Fish sounds—pounds	100,391	17,454
Fish scrap and fish meal—tons	43,722	1,389,641
Isinglass—pounds	67,564	30,943
Kelp—do	392,408	5,531
Skins, fish, raw or salted—do	1,177,364	73,633
Skins, seal, raw (not fur skins)—do	1,476,224	143,486

Imports of fishery products entered for consumption, 1936—Continued

Item	Quantity	Value
NONEDIBLE FISHERY PRODUCTS—continued		
Spermaceti wax.....pounds	181,297	$25,073
Whalebone, unmanufactured		247
Whalebone, manufactures of		940
Total		2,133,913
Total, nonedible fishery products		11,516,121
Grand total		41,872,560

FISHERIES OF THE NEW ENGLAND STATES

(Area XXII) [4]

The most recent complete fishery statistics for the New England States (Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut) are those collected for the year 1935. In that year the yield of the commercial fisheries amounted to 655,430,400 pounds, valued at $17,983,594 to the fishermen, representing an increase of 31 percent in volume, and 33 percent in value as compared with the catch in 1933, the most recent previous year for which statistics are available. Detailed statistics of these fisheries for 1935 appear in "Fishery Industries of the United States, 1936," appendix I to the Report of the United States Commissioner of Fisheries, 1937. A summary of these fisheries as well as statistics of the vessel fisheries at the principal New England ports for 1936 and the mackerel fishery of the Atlantic coast for 1936 appear in the following tables.

Fisheries of the New England States, 1935

OPERATING UNITS: BY STATES

Item	Maine	New Hampshire	Massachusetts	Rhode Island	Connecticut	Total
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	490	----------	3,904	280	349	5,023
On boats and shore:						
Regular	2,823	45	2,849	429	276	6,422
Casual	3,202	164	1,971	874	793	7,004
Total	6,515	209	8,724	1,583	1,418	18,449
Vessels:						
Steam	----------	----------	29	7	3	39
Net tonnage	----------	----------	4,950	200	827	5,977
Motor	91	----------	340	70	81	582
Net tonnage	992	----------	12,873	804	1,405	16,074
Total vessels	91	----------	369	77	84	621
Total net tonnage	992	----------	17,823	1,004	2,232	22,051
Boats:						
Motor	2,321	43	1,374	460	259	4,457
Other	1,737	28	1,666	666	526	4,623
Accessory boats	183	----------	562	86	26	857
Apparatus:						
Purse seines:						
Mackerel	26	----------	74	1	----------	101
Length, yards	5,075	----------	34,395	300	----------	39,770

[4] This is the number given this area by the North American Council on Fishery Investigations. It should be explained that there are included under this area craft whose principal fishing ports are in the area but at times fish elsewhere. Notable examples are the groundfish fishery in area XXI and the mackerel and southern trawl fisheries in area XXIII. For a clearer understanding of the statistics published in this section, the reader is referred to the section in the latter part of this document entitled "Statistical survey procedure."

Fisheries of the New England States, 1935—Continued

OPERATING UNITS: By States—Continued

Item	Maine	New Hampshire	Massachusetts	Rhode Island	Connecticut	Total
Apparatus—Continued.						
Purse seines—Continued.	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Menhaden				1		1
Length, yards				400		400
Other	53		2			55
Length, yards	5,005		800			5,805
Haul seines	66		14	9	51	140
Length, yards	6,425		1,472	687	5,010	13,594
Gill nets:						
Anchor	1,090		2,187	5		3,282
Square yards	322,131		792,580	14,160		1,128,871
Drift	187	3	2,620	49	48	2,907
Square yards	49,003	540	1,340,644	36,380	66,867	1,493,434
Stake	125				5	130
Square yards	13,146				840	13,986
Lines:						
Hand	5,566	677	213	145	107	6,708
Hooks and baits	5,667	677	374	179	125	7,022
Trawl	28,514	100	30,987	71	618	60,290
Hooks	1,510,100	5,000	1,661,115	30,155	21,672	3,228,042
Troll				45		45
Hooks				45		45
Trot with hooks				1	4	5
Hooks				200	700	900
Pound nets			120	43	14	177
Floating traps	25		32	39		96
Weirs	181		3			184
Fyke nets	49		16	127	111	303
Dip nets	96		90		231	417
Bag nets	126	22				148
Push nets			40			40
Otter trawls	49		292	59	79	479
Yards at mouth	1,085		8,502	1,489	2,133	13,209
Box traps	10					10
Pots:						
Crab	1,947		4,123	37		6,107
Eel	125		933	982	966	3,006
Fish					12	12
Lobster	184,592	3,287	58,419	25,255	17,884	289,437
Periwinkle and cockle			50	1,174		1,224
Harpoons	86		60	47	26	219
Spears	5		16	19	10	50
Dredges:						
Clam			44	19		63
Yards at mouth			22	14		36
Oyster			48	36	76	160
Yards at mouth			54	54	115	223
Scallop	154		2,515	918		3,587
Yards at mouth	233		2,189	731		3,153
Tongs:						
Oyster			34	57	10	101
Other			269	729	63	1,061
Rakes:						
Oyster				16	2	18
Other	9		700	70	121	900
Forks			278	7		285
Hoes	1,924	33	1,292	86	21	3,356

Fisheries of the New England States, 1935—Continued

CATCH: BY STATES[1]

Species	Maine		New Hampshire		Massachusetts		Rhode Island		Connecticut		Total	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	3,373,900	$17,105			958,700	$7,797	55,400	$381	17,600	$184	4,405,600	$25,467
Anchovies							3,700	74			3,700	74
Bluefish					91,300	9,713	147,500	10,972	118,300	11,783	357,100	32,468
Bonito					17,800	718	15,200	783			33,000	1,501
Butterfish	25,700	1,494			1,478,700	55,156	734,800	23,861	54,500	2,992	2,293,700	83,503
Carp									51,900	3,860	51,900	3,860
Cod	8,407,200	160,690	13,900	$525	110,633,700	2,313,898	608,100	16,090	670,900	22,890	120,333,800	2,514,093
Crevalle							1,500	15			1,500	15
Croaker					2,278,100	41,307			72,400	1,478	2,350,500	42,785
Cunner	200	6					800	4			1,000	10
Cusk	2,734,100	47,588	2,200	66	4,819,900	89,057					7,556,200	136,711
Drum, red					2,200	35					2,200	35
Eels:												
Common	95,600	7,048			105,800	7,065	162,700	13,295	55,900	5,337	420,000	32,745
Conger					110,500	1,345	1,700	149	1,200	57	113,400	1,551
Flounders	1,669,000	47,678	44,300	1,813	28,377,600	997,215	2,349,800	80,449	6,293,500	194,110	38,734,200	1,321,265
Frigate mackerel					73,500	368	8,300	134			81,800	502
Goosefish					2,300	34					2,300	34
Grayfish	300	1			30,400	686	4,600	46			35,300	733
Haddock	4,245,300	153,984	33,400	1,672	189,860,200	4,106,404			466,800	14,670	194,605,700	4,276,730
Hake	16,231,700	154,095	4,100	82	10,271,500	220,452	1,800	29	32,200	1,420	26,541,300	376,078
Halibut	44,800	5,486			2,780,500	238,708			100,000	8,000	2,925,300	252,194
Herring, sea	50,942,500	260,722			3,189,800	23,222	196,300	2,167			54,328,600	286,111
Herring smelt					13,400	253					13,400	253
Hickory shad							200	2			200	2
Kingfish or "king mackerel"									100	4	100	4
King whiting or "kingfish"					4,100	158	900	25			5,000	183
Lamprey									1,800	375	1,800	375
Launce					34,000	550	100	1			34,100	551
Mackerel	1,476,600	25,388	1,800	108	59,652,100	1,206,904	817,300	16,474	2,400	180	61,950,200	1,249,054
Menhaden					21,000	205	4,256,100	13,683	7,300	74	4,284,400	13,962
Minnows									4,500	2,409	4,500	2,409
Mummichog									6,000	1,150	6,000	1,150
Pilotfish					600	8					600	8
Pollock	5,018,400	57,466	4,500	134	28,281,100	487,661	37,500	1,113	53,000	866	33,394,500	547,240
Rosefish	47,400	379			17,109,500	183,709					17,156,900	184,088
Salmon	39,400	9,366			900	202					40,300	9,568

[1] Excluding seed oyster fishery. The seed oyster fishery in this section was prosecuted in Rhode Island and Connecticut where 167 fishermen, using 28 vessels, 1 motorboat, 15 other boats, 161 dredges, and 7 tongs, took 106,243 bushels of seed oysters, valued at $42,600, from public beds, and 376,568 bushels, valued at $175,934 from private beds. Of the total number of persons fishing for seed oysters, 13 are duplicated among those fishing for market oysters or other species. Similarly the following craft and gear are duplicated: 2 vessels, 4 dredges, and 2 tongs.

Fisheries of the New England States, 1935—Continued

CATCH: By States—Continued

Species	Maine		New Hampshire		Massachusetts		Rhode Island		Connecticut		Total	
FISH—continued	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Scup or porgy					4,786,000	$114,376	1,851,900	$42,361	112,800	$3,056	6,750,700	$159,793
Sea bass					3,322,100	116,333	63,000	3,479	31,000	2,173	3,416,100	121,985
Sea robin					17,500	215	219,000	2,078	39,500	707	276,000	3,000
Shad	13,000	$753			306,000	5,900	5,600	364	402,600	32,685	727,200	39,702
Sharks	36,400	390			42,200	567	2,200	44			80,800	1,001
Skates	2,500	31			7,700	105	167,100	1,403	49,600	795	226,900	2,334
Skipper or "billfish"					300	3	200	2			500	5
Smelt	682,800	79,648	42,200	$6,330	600	6	1,000	200	1,900	353	728,500	86,537
Squeteagues or "sea trout", gray					260,500	10,747	38,000	2,552	28,500	1,544	327,000	14,843
Striped bass					5,100	537	16,200	2,094	400	55	21,700	2,686
Sturgeon	900	90			2,700	303	1,400	123			5,000	516
Suckers	15,200	819							81,400	3,032	96,600	3,851
Swordfish	309,400	38,979			2,295,000	332,655	295,500	33,242	85,700	13,996	2,985,600	423,872
Tautog					38,100	1,671	165,100	5,272	55,600	3,826	258,800	10,769
Thimble-eyed mackerel							45,800	496			45,800	496
Tilefish					700	16			160,000	8,000	160,700	8,016
Tomcod	11,300	279							5,200	260	16,500	539
Tuna or "horse mackerel"	271,400	5,527			223,600	6,887	43,500	1,517			538,500	13,931
White perch	100	5			50,000	5,684	1,100	66			51,200	5,755
Whiting	12,500	76			15,418,100	160,009	1,954,500	21,387	29,900	449	17,415,000	181,921
Wolffish	75,000	848			2,849,200	58,754			10,000	100	2,934,200	59,702
Yellow perch	2,400	336					500	50			2,900	386
Total	95,785,000	1,076,277	146,400	10,730	489,824,600	10,807,598	14,275,900	301,477	9,104,400	342,870	609,136,300	12,538,952
SHELLFISH, ETC.												
Crabs:												
Hard	593,500	16,220			2,394,000	39,580	114,100	2,994	4,500	490	3,106,100	59,284
Soft and peelers									300	97	300	97
Lobsters	7,687,200	1,767,498	194,400	49,523	1,805,300	448,327	619,000	132,690	546,400	122,186	10,852,300	2,520,224
Clams:												
Hard, public [2]	1,700	152			1,241,600	140,618	2,252,100	207,883	421,400	85,666	3,916,800	434,319
Hard, private [2]					24,000	2,842	108,000	10,704	7,900	2,849	139,900	16,395
Razor					583,000	13,682					583,000	13,682
Soft, public [3]	6,960,000	286,484	13,300	1,337	2,488,100	248,155	309,200	19,742	30,700	5,045	9,801,300	560,763
Surf or skimmer					800	50					800	50
Mussels, sea	117,100	2,875									117,100	2,875
Oysters, market: [4]												
Public, spring					3,300	625	28,800	4,930	1,600	145	33,700	5,700
Public, fall							29,700	5,467	800	135	30,500	5,602

Private, spring					266,800	77,234	2,374,000	238,129	1,933,000	255,062	4,573,800	570,425
Private, fall							2,794,500	276,215	2,571,700	352,300	5,366,200	628,515
Periwinkles and cockles	3,000	90			2,700	345	153,200	6,722			158,900	7,157
Scallops:												
Bay					1,142,300	199,764	74,700	11,495	287,500	50,000	1,504,500	261,259
Sea	743,200	115,620			924,300	115,089	2,600	247			1,670,100	230,956
Squid					2,149,600	27,717	1,388,100	29,206	5,800	125	3,543,500	57,048
Irish moss					7,500	300					7,500	300
Bloodworms	227,800	34,653			55,500	2,665					283,300	37,318
Sandworms	65,500	9,173			504,000	23,300					569,500	32,473
Sea urchins	35,000	200									35,000	200
Total	16,434,000	2,232,965	207,700	50,860	13,592,800	1,340,293	10,248,000	946,424	5,811,600	874,100	46,294,100	5,444,642
Grand total	112,219,000	3,309,242	354,100	61,580	503,417,400	12,147,891	24,523,900	1,247,901	14,916,000	1,216,970	655,430,400	17,983,594

[2] Statistics on hard clams used in this table are based on yields of 11 pounds of meat per bushel in Maine; 11.01 pounds in Massachusetts; 16 pounds in Rhode Island, and 10 pounds in Connecticut.

[3] Statistics on soft clams used in this table are based on yields of 15 pounds of meat per bushel in Maine and New Hampshire; 13.64 pounds in Massachusetts; 20 pounds in Rhode Island, and 14.94 pounds in Connecticut.

[4] Statistics on oysters used in this table are based on yields of 6.57 pounds of meat in Massachusetts; 7.31 pounds in Rhode Island; and 8 pounds in Connecticut.

NOTE.—Included in the catch of Massachusetts are 15,098,600 pounds of fishery products, valued at $465,905, which were taken in the southern winter trawl fishery off southern New Jersey, Maryland, Virginia, and North Carolina. These products consisted principally of croakers, flounders, scup, and sea bass.

Industries related to the fisheries of the New England States

OPERATING UNITS, SALARIES, AND WAGES, 1935

Item	Maine and New Hampshire	Massachusetts	Rhode Island	Connecticut	Total
Transporting:					
Persons engaged:	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	62	45	3	14	124
On boats	15		3		18
Total	77	45	6	14	142
Vessels, motor	31	11	2	6	50
Net tonnage	364	314	15	216	909
Boats	12		3		15
Wholesale and manufacturing:					
Establishments	149	170	31	30	380
Persons engaged:					
Proprietors	108	102	27	28	265
Salaried employees	195	443	36	44	718
Wage earners:					
Average for season	5,034	3,787	383	374	9,578
Average for year	2,012	2,983	276	230	5,501
Paid to salaried employees	$318,559	$948,553	$92,299	$121,401	$1,480,812
Paid to wage earners	$1,241,799	$3,344,633	$230,077	$159,135	$4,975,644
Total salaries and wages	$1,560,358	$4,293,186	$322,376	$280,536	$6,456,456
Fishermen manufacturing	1,273	2,181	337	1	3,792

Industries related to the fisheries of the New England States—Continued

PRODUCTS MANUFACTURED

Item	Maine		Massachusetts		Rhode Island		Connecticut	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
By manufacturing establishments:								
Alewives, salted, tight-pack ..... pounds	1,536,880	$37,985						
Cod:								
Fresh fillets [1] ..... do	91,784	7,384	6,032,272	$664,307				
Fresh sticks [1] ..... do	380,607	35,807						
Frozen fillets [1] ..... do	316,675	27,193	7,734,258	738,343				
Salted:								
Green [2] ..... do	950,998	45,499	(3)	(3)				
Dry ..... do	26,465	1,064	(3)	(3)				
Boneless, including absolutely boneless ..... do	167,084	24,632	5,526,395	1,003,811				
Oil, cod [1] ..... gallons	13,792	5,286	(3)	(3)				
Oil, cod liver [1] ..... do	(3)	(3)	267,529	163,856				
Cusk:								
Fresh fillets [1] ..... pounds	76,658	7,882	634,943	62,128				
Fresh sticks [1] ..... do	466,399	49,074						
Frozen fillets [1] ..... do	(3)	(3)	238,428	20,130				
Salted, green [2] ..... do	53,040	2,072	(3)	(3)				
Smoked fillets ..... do	82,005	10,801						
Flounders:								
Fresh fillets [1] ..... do	(3)	(3)	1,326,231	187,428				
Frozen fillets [1] ..... do	43,908	5,048	655,233	98,397				
Haddock:								
Fresh fillets [1] ..... do	100,541	17,897	16,144,584	1,822,229				
Frozen fillets [1] ..... do	206,855	19,472	22,588,491	2,132,085				
Fresh sticks [1] ..... do	22,850	4,108						
Salted, green [2] ..... do	6,250	131						
Hake:								
Fresh fillets [1] ..... do	165,232	16,466	1,154,703	104,527				
Frozen fillets [1] ..... do	(3)	(3)	1,854,757	127,187				
Fresh sticks [1] ..... do	439,535	44,529						
Salted:								
Green [2] ..... do	1,575,831	44,842	(3)	(3)				
Dry ..... do	452,926	12,544	1,634,966	84,906				
Smoked fillets ..... do	78,245	9,968						

See footnotes at end of table.

Industries related to the fisheries of the New England States—Continued

PRODUCTS MANUFACTURED—Continued

Item	Maine		Massachusetts		Rhode Island		Connecticut	
By manufacturing establishments—Contd.								
Herring, sea:	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Salted, split—pounds	1,085,787	$35,848						
Smoked:								
Bloaters, hard—do	171,789	7,001	(3)	(3)				
Bloaters, soft—do	113,946	6,522	(3)	(3)				
Boneless—do	2,603,604	275,654						
Lengthwise—do	117,105	7,083						
Medium scaled—do	345,300	22,488						
Kippered—do			(3)	(3)				
Canned "sardines" [1]—standard cases	1,845,860	5,740,454	118,520	$14,004				
Meal [1]—tons	2,587	71,343						
Oil [1]—gallons	60,413	8,313						
Mackerel:								
Fresh fillets [1]—pounds			131,350	12,517				
Frozen fillets [1]—do			392,189	38,230				
Salted:								
Fillets—do			1,874,480	152,083				
Split—do			2,459,507	196,157				
Pollock:								
Fresh fillets [1]—do	55,804	4,602	2,265,637	160,481				
Frozen fillets [1]—do	346,120	22,872	12,225,791	776,245				
Fresh sticks [1]—do	48,000	3,810						
Salted:								
Green [2]—do	98,946	3,953	(3)	(3)				
Dry—do	16,791	797	(3)	(3)				
Rosefish:								
Fresh fillets [1]—do	(3)	(3)	3,941,008	374,187				
Frozen fillets [1]—do			11,574,371	1,139,109				
Whiting:								
Frozen fillets [1]—do			2,518,628	122,381				
Frozen sticks [1]—do			6,278,613	314,438				
Fresh and frozen split butterfly [1]—do			149,775	8,350				
Wolffish:								
Fresh fillets [1]—do			22,666	2,549				
Frozen fillets [1]—do	(3)	(3)	173,565	18,658				
Crab meat, packaged, fresh cooked—do	70,067	34,328	257,576	109,166	(3)	(3)		
Lobster meat, packaged, fresh cooked—do	(3)	(3)	111,900	117,885	(3)	(3)		
Clams, hard, fresh shucked—gallons					33,560	$43,072		

Clams, soft:								
Fresh shucked	do	43,055	43,438	99,560	135,177	11,290	11,581	
Canned:								
Whole [1]	standard cases	105,672	373,773					
Juice, bouillon and cocktail [1]	do	15,875	24,595					
Chowder [1]	do	62,339	194,952					
Marine-shell buttons [1]	gross	(3)	(3)	(3)	(3)		1,650,453	$1,054,719
Oysters, fresh shucked	gallons			(3)	(3)	426,012	656,792	322,825	467,605
Unclassified products:								
Packaged fish, fresh and frozen [1]	pounds	[4] 257,345	[4] 20,935	[5] 576,800	[5] 66,104			
Salted	do	[6] 253,125	[6] 14,610	[7] 6,530,189	[7] 481,551			
Smoked	do	[8] 402,100	[8] 50,080	[9] 2,260,378	[9] 344,847	(10)	(10)	(10)	(10)
Canned:								
Fish cakes and flakes [1]	standard cases	30,421	244,936	79,191	600,541			
Cat and dog food [1]	do	(11)	(11)	40,574	79,081			
Other [1]	do	[12] 6,121	[12] 30,350	[13] 48,875	[13] 353,925	(10)	(10)		
Meal, groundfish	tons	(10)	(10)	14,994	652,140				
Oil, miscellaneous liver [1]	gallons	(10)	(10)	[14] 12,403	[14] 604,326				
Miscellaneous [15]			[16] 254,776		[17] 978,790		[18] 107,025		[19] 146,660
Total			7,927,197		15,062,256		818,470		1,668,984
By fishermen:								
Alewives, smoked	pounds	117,258	3,062	5,000	250			
Cod:								
Fresh fillets	do	360	22					
Salted, green [2]	do			406,500	10,975			
Salted, dry	do	4,300	272					
Cusk, salted, green [2]	do			1,000	20			
Haddock, salted, green [2]	do			20,600	410			
Hake:								
Fresh fillets	do	2,827	254					
Salted, green [2]	do			5,000	50			
Herring, sea, smoked, bloaters, soft	do	1,000	106					
Mackerel, salted, split	do			18,000	675			
Pollock, salted, dry	do	5,000	400					
Crab meat, packaged, fresh cooked	do	1,070	412	10,900	5,230	3,000	1,200	
Clams, hard, fresh shucked	gallons					25	44		
Clams, razor, fresh shucked	do			30,915	13,132				
Clams, soft:								
Fresh shucked	do	68,647	49,073	15,504	18,792	400	700		
Steamed	pounds	228,873	19,494						
Oysters, fresh shucked	gallons			4,200	7,383				

See footnotes at end of table.

Industries related to the fisheries of the New England States—Continued

PRODUCTS MANUFACTURED—Continued

Item	Maine		Massachusetts		Rhode Island		Connecticut	
By fishermen—Continued.								
Scallops:	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Bay, fresh shucked.....gallons			123, 528	$357, 700	8, 301	$27, 863		
Sea, fresh shucked.....do	42, 900	$71, 156	63, 007	91, 286			45	$59
Total		144, 251		505, 903		29, 807		59
Grand total		8, 071, 448		15, 568, 159		848, 277		1, 669, 043

[1] Data are for 1936.
[2] This item is usually an intermediate product, and although included in the total, may also be shown in its final stage of processing in this or another State.
[3] This item has been included under "Unclassified products."
[4] Includes fresh fillets of flounder and frozen fillets of cusk, rosefish, wolffish, and hake.
[5] Includes fresh fillets of halibut and whiting; frozen fillets of bluefish, halibut, and salmon; fresh steaks of cod, haddock, halibut, pollock, salmon, and swordfish; and frozen steaks of cod, halibut, pollock, salmon, swordfish, and wolffish.
[6] Includes salted fillets of hake and sea herring; dry-salted cusk; and salted boneless hake and whole sea herring.
[7] Includes dry-salted cod, pollock, and haddock; green-salted cod, cusk, pollock, and hake; salted boneless cusk and hake; whole and pickled sea herring, and strips and bits of cod.
[8] Includes smoked fillets of cod, haddock, and sea herring; and finnan haddie.
[9] Includes smoked alewives, butterfish, carp, cod fillets, haddock (finnan haddie), lake trout, mackerel, salmon, sea herring (medium-scaled, and hard and soft bloaters), shad, and whitefish; and smoked and spiced salmon.
[10] This item has been included under "Miscellaneous."
[11] This item has been included under "Other" canned products.
[12] Includes canned alewife roe, finnan haddie, mackerel, fish chowder, clam cakes, and cat and dog food.
[13] Includes canned groundfish roe, mackerel, finnan haddie, fish chowder, fiskeboller, hard and soft clam chowder, and rat poison bait.
[14] Includes halibut, swordfish, tuna, sablefish, "lingcod," and mixed liver oils.
[15] Both 1935 and 1936 data are included in these items.
[16] Includes fresh-cooked lobster meat; fresh-shucked sea mussels; herring dry scrap; soft clam, groundfish, miscellaneous fish and waste fish meals; cod-liver oil; marine-shell buttons and pearl essence.
[17] Includes fresh-shucked oysters, cod and rosefish oil, cod liver pressings, groundfish dry scrap, glue, isinglass, and marine-shell buttons and novelties.
[18] Includes fresh-cooked lobster meat, fresh-cooked packaged crab meat, finnan haddie, canned hard clam chowder, oyster-shell poultry feed and lime, and marine-shell novelties.
[19] Includes smoked butterfish, carp, lake trout, mackerel, salmon, whitefish, and paddlefish or spoonbill cat; and marine-shell novelties.

NOTE.—Unless otherwise indicated the data are for 1935. The total value of manufactured products for the New England States was as follows: By manufacturing establishments, $25,476,907; and by fishermen $680,020. Some of the above products may have been manufactured from products imported from another State or a foreign country, therefore they cannot be correlated directly with the catch within the State. Of the total number of persons engaged in the preparation of fishermen's manufactured products, 3,664 have also been included as fishermen, and 8 of the persons shown on transporting craft have also been included as fishermen. This should be considered when computing the total number of persons in the fishery industries exclusive of duplication.

VESSEL FISHERIES AT PRINCIPAL NEW ENGLAND PORTS

Due to the importance of the ports of Boston and Gloucester, Mass., and Portland, Maine, as landing points for fishery products, detailed monthly statistics are collected for these landings which are published in the following sections.

ECONOMIC ASPECT

The landings of fishery products at the three principal New England ports (Boston and Gloucester, Mass., and Portland, Maine), by vessels of 5 net tons capacity or more, during 1936, amounted to 414,767,145 pounds as landed, valued at $11,143,545. This is an increase of 11 percent in the quantity of the catch as compared with 1935, and an increase of 24 percent in the value of the catch. The landings at Boston accounted for 339,224,764 pounds, valued at $9,588,115 or 82 percent of the total volume; the landings at Gloucester amounted to 59,413,534 pounds, valued at $1,171,681, or 14 percent of the total; and the landings at Portland amounted to 16,128,847 pounds, valued at $383,749, or 4 percent of the total.

Among the landings of fresh fish, haddock far outranked other species in volume landed. Landings of all sizes in 1936 amounted to 143,878,750 pounds, or 35 percent of the total fresh fish.

Landings by fishing vessels at the three principal New England ports, 1936

BOSTON: BY MONTHS

Species	January		February		March		April		May		June		July	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:														
Large	1,649,340	$77,988	1,836,735	$105,215	5,914,735	$161,625	4,910,625	$98,835	2,583,070	$51,371	1,670,862	$45,604	1,865,615	$50,552
Market	1,854,874	71,684	1,239,582	58,859	3,410,191	100,571	3,005,990	65,109	2,086,895	44,484	3,311,410	77,296	4,703,415	106,120
Scrod	131,425	4,659	40,460	1,348	30,970	858	22,225	428	54,060	887	125,150	2,174	339,690	5,501
Haddock, fresh:														
Large	6,729,612	303,685	8,881,685	416,895	16,483,460	534,576	13,568,260	322,962	8,584,551	217,864	6,805,960	207,005	6,845,715	197,779
Scrod	2,244,335	80,032	1,348,220	56,598	2,401,610	72,436	3,194,900	63,286	3,639,188	70,663	4,407,250	86,212	3,651,852	79,583
Hake, fresh:														
Large	803,891	33,227	442,240	26,371	540,605	20,839	416,425	14,425	629,685	10,201	687,315	15,188	892,395	17,678
Small	15,200	654	46,000	2,283	56,800	2,143	9,150	217	34,700	646	32,650	810	96,275	2,165
Pollock, fresh	1,137,794	36,321	885,880	35,420	1,167,000	37,586	1,549,190	36,909	771,130	16,990	221,225	5,325	466,070	10,747
Cusk, fresh	434,200	15,133	273,425	11,736	540,275	14,331	398,390	7,196	426,790	6,059	254,210	5,074	405,390	7,523
Halibut, fresh	93,107	4,714	110,379	14,704	238,232	32,961	304,048	31,287	341,721	27,843	280,874	23,495	206,739	23,553
Mackerel, fresh					60	9	644,915	19,242	3,526,930	83,428	5,667,445	116,847	4,615,815	101,798
Flounders, fresh	1,076,424	46,230	1,840,846	75,033	1,365,650	47,521	1,037,090	41,512	1,700,280	42,298	1,376,445	40,987	816,593	35,458
Swordfish, fresh											111,793	32,788	440,455	94,287
Wolffish, fresh	85,096	2,796	145,505	5,147	284,250	7,528	525,055	10,339	348,595	6,433	96,715	2,615	72,425	2,046
Rosefish, fresh	1,062,439	13,591	1,445,324	26,865	1,954,710	37,774	2,610,338	53,920	5,173,713	65,618	3,890,366	41,456	2,824,844	39,074
Herring, fresh													400	6
Other, fresh	16,115	1,030	42,085	2,764	110,915	4,855	44,690	1,617	1,315,850	27,608	3,627,670	67,579	3,983,543	64,925
Total, fresh	17,333,852	691,744	18,578,366	839,238	34,499,463	1,075,613	32,241,291	767,284	31,217,158	672,393	32,567,340	770,455	32,227,231	838,795
Landed in 1935:														
Fresh	17,836,595	597,211	22,502,386	508,048	29,841,841	713,032	31,105,712	614,961	29,465,482	578,009	26,374,297	509,095	29,923,592	673,591

NOTE.—The weights of fresh and salted fish given in these statistics represent the fish as landed from the vessels, and the values are those received by the fishermen. Large cod are classified as those weighing over 10 pounds; market cod, 2½ to 10 pounds; and scrod cod, 1 to 2½ pounds. Large haddock are those weighing over 2½ pounds and scrod haddock, 1 to 2½ pounds. Large hake are those weighing over 6 pounds and small hake, under 6 pounds. Only landings by vessels having a capacity of 5 net tons or greater are used in this tabulation.

Species	August		September		October		November		December		Total, 1936		1935	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:														
Large	1,406,280	$48,219	1,282,080	$57,898	1,576,683	$67,390	2,415,100	$77,288	2,405,203	$69,873	29,516,328	$911,858	30,628,143	$836,063
Market	3,438,980	82,612	2,767,160	77,543	3,189,185	86,411	3,185,737	88,174	3,729,610	96,931	35,923,029	955,794	39,397,774	846,155
Scrod	525,400	9,464	734,025	15,535	945,975	18,808	699,045	15,263	767,560	15,598	4,415,985	90,523	718,175	15,929
Cod, salted:														
Large					1,020	33					1,020	33	5,100	135
Market					135	3					135	3		
Haddock, fresh:														
Large	7,301,215	211,594	7,005,200	240,370	6,097,545	237,434	4,989,945	219,797	4,299,705	196,625	97,592,853	3,306,586	100,634,558	2,690,924
Scrod	4,830,052	107,626	5,489,060	129,495	3,584,764	93,368	1,505,160	48,670	1,875,065	49,644	38,171,456	937,613	47,150,705	1,003,161
Hake, fresh:														
Large	999,435	18,369	541,385	13,871	759,635	21,202	632,830	19,778	652,020	18,689	7,997,861	229,838	7,404,480	178,775
Small	120,780	2,683	133,375	4,094	137,700	4,465	65,330	2,371	46,650	1,626	794,610	24,157	693,517	17,309
Hake, salted:														
Large					75	1					75	1		
Pollock, fresh	427,500	9,678	956,110	21,277	1,168,710	24,672	3,145,115	57,496	2,264,085	43,347	14,159,809	335,768	13,754,147	276,938
Cusk, fresh	681,435	11,510	502,490	10,601	629,078	14,000	468,195	11,803	786,789	17,117	5,800,667	132,083	3,877,030	76,209
Halibut, fresh	130,012	13,316	141,594	18,861	146,319	18,180	35,877	4,291	30,981	4,862	2,059,883	218,067	2,036,267	205,412
Mackerel, fresh	2,773,395	77,601	1,673,946	68,153	846,600	46,088	926,885	55,852	336,715	26,055	21,012,706	595,073	27,014,236	540,095
Mackerel, salted	865	24									865	24		
Flounders, fresh	651,185	33,959	620,365	33,830	877,240	47,782	1,256,605	57,609	1,261,841	52,210	13,880,564	554,429	13,499,643	436,231
Swordfish, fresh	484,432	86,320	158,618	38,204	222	56					1,195,520	251,655	2,024,199	359,409
Wolffish, fresh	71,245	2,325	60,595	1,932	56,945	2,051	42,960	1,436	130,695	2,107	1,920,081	46,755	2,048,570	49,586
Rosefish, fresh	3,310,567	51,267	6,925,154	106,111	6,983,675	111,569	7,117,832	98,239	6,120,052	74,747	49,419,014	720,231	14,144,274	150,305
Herring, fresh											400	6	4,000	25
Other, fresh	2,790,480	44,985	2,147,770	35,060	1,012,440	20,324	232,060	5,888	38,285	983	15,361,903	277,618	2,337,144	50,081
Total, fresh	29,942,393	811,528	31,138,927	872,835	28,012,716	813,800	26,718,676	763,955	24,745,256	670,414	339,222,669	9,588,054	307,366,862	7,732,607
Total, salted	865	24			1,230	37					2,095	61	5,100	135
Grand total	29,943,258	811,552	31,138,927	872,835	28,013,946	813,837	26,718,676	763,955	24,745,256	670,414	339,224,764	9,588,115	307,371,962	7,732,742
Landed in 1935:														
Fresh	26,090,820	691,014	26,828,264	742,930	26,448,105	758,620	20,006,946	632,863	20,942,822	713,233			307,366,862	7,732,607
Salted			5,100	135									5,100	135
Total	26,090,820	691,014	26,833,364	743,065	26,448,105	758,620	20,006,946	632,863	20,942,822	713,233			307,371,962	7,732,742

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Landings by fishing vessels at the three principal New England ports, 1936—Continued

GLOUCESTER: BY MONTHS

Species	January		February		March		April		May		June		July	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:														
Large	56,235	$3,269	95,035	$5,622	641,917	$17,098	1,230,418	$29,400	1,299,299	$29,989	776,025	$24,386	210,785	$5,648
Market	40,600	1,412	10,660	514	231,600	5,579	249,682	4,858	160,972	3,171	170,580	2,874	171,540	3,920
Scrod	6,115	126	1,680	41	2,710	54	1,650	29	12,594	260	890	8	14,350	228
Cod, salted:														
Large					50,000	2,000	39,465	1,091	71,630	1,952	31,055	901	229,462	8,898
Market					101,639	3,049	6,730	135	24,250	514	7,100	135	265,360	7,915
Scrod					30,866	617							40,649	814
Haddock, fresh:														
Large	92,995	4,833	12,580	708	920,030	28,178	810,669	18,337	178,240	5,336	189,525	4,438	138,995	3,438
Scrod	11,725	460	3,405	103	77,820	2,190	125,907	2,385	4,935	89	115,800	2,276	53,115	1,163
Haddock, salted, large													2,510	50
Hake, fresh, large	17,580	497	24,225	1,074	20,955	564	12,461	342	34,114	414	23,725	358	22,365	314
Hake, salted, large									1,270	19			780	16
Pollock, fresh	663,325	18,373	880	37	62,995	1,611	72,596	1,590	50,068	1,044	19,040	335	187,355	4,675
Cusk, fresh	655	20	18,520	821	10,135	236	34,620	444	15,325	173	1,700	21	36,745	549
Halibut, fresh			59	9	520	62	1,967	283	1,906	226	2,300	203	17,660	1,133
Halibut, salted									13,685	781	2,210	111		
Mackerel, fresh							39,000	780	357,375	5,675	1,095,725	17,636	2,068,010	32,584
Mackerel, salted											75,990	1,477	13,765	499
Flounders, fresh	57,820	2,901	41,050	2,029	56,355	1,711	38,488	1,159	88,946	2,274	51,795	1,351	44,325	1,396
Swordfish, fresh											1,256	402	230	37
Wolffish, fresh	2,920	95	1,645	53	22,235	499	18,787	335	6,690	97	3,870	73	3,025	58
Rosefish, fresh	19,675	198	67,895	960	147,423	2,621	515,400	9,816	2,422,440	33,618	1,710,410	18,899	1,196,430	16,796
Herring, frozen					276,690	5,534								
Herring, salted	247,104	7,624							74,700	2,054				
Other, fresh	150	1	1,865	23	5,865	106	3,155	40	220,671	6,980	668,945	14,637	246,562	6,475
Total, fresh	969,795	32,185	279,499	11,994	2,200,560	60,509	3,154,800	69,798	4,853,575	89,346	4,831,586	87,897	4,411,492	78,414
Total, frozen					276,690	5,534								
Total, salted	247,104	7,624			182,505	5,666	46,195	1,226	185,535	5,320	116,355	2,624	552,526	18,192
Grand total	1,216,899	39,809	279,499	11,994	2,659,755	71,709	3,200,995	71,024	5,039,110	94,666	4,947,941	90,521	4,964,018	96,606
Landed in 1935:														
Fresh	705,645	26,413	950,476	21,918	2,046,100	42,168	2,886,630	55,206	3,495,766	59,301	5,206,782	69,162	6,114,225	78,679
Salted	420,832	12,676			12,575	357	28,000	845	268,185	9,440	85,740	2,204	608,683	15,591
Total	1,126,477	39,089	950,476	21,918	2,058,675	42,525	2,914,630	56,051	3,763,951	68,741	5,292,522	71,366	6,722,908	94,270

Species	August		September		October		November		December		Total, 1936		1935	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:														
Large	20,905	$533	138,630	$6,777	162,727	$6,852	125,425	$4,046	112,808	$3,630	4,870,209	$137,250	8,669,729	$203,305
Market	73,390	1,859	195,565	5,125	160,493	4,008	122,915	2,990	95,422	2,372	1,683,419	38,682	2,236,581	29,036
Scrod	35,670	693	124,080	2,897	31,695	714	10,733	214	2,885	42	245,052	5,306	46,145	829
Cod, salted:														
Large	21,532	735	219,210	7,330	244,797	7,591					907,151	30,498	1,241,889	41,530
Market	36,383	907	2,220	53	75	2					443,757	12,710	976,184	24,403
Scrod	13,083	262									84,598	1,693	184,102	2,655
Haddock, fresh:														
Large	117,005	3,024	362,960	10,282	160,805	5,416	64,426	2,252	80,681	3,121	3,128,911	89,363	3,174,320	60,311
Scrod	109,630	2,573	197,235	4,794	101,385	2,529	12,575	266	32,070	814	845,602	19,642	1,618,865	19,097
Haddock, salted:														
Large											2,510	50	6,088	92
Scrod													60	4
Hake, fresh:														
Large	22,887	323	149,666	3,371	210,289	4,210	66,877	1,700	95,918	2,258	701,062	15,425	215,167	4,750
Small			13,000	247	17,420	285	7,870	170	11,125	214	49,415	916	9,384	183
Hake, salted:														
Large	670	13									2,720	48	2,080	46
Small													855	21
Pollock, fresh	952,330	22,299	1,206,515	22,731	3,225,383	55,833	6,827,598	94,304	3,877,880	57,507	17,145,965	280,339	13,281,759	246,592
Pollock, salted			860	10							860	10	805	17
Cusk, fresh	4,065	60	12,119	175	5,547	99	1,875	39	10,035	187	151,341	2,824	179,337	1,757
Cusk, salted			5,000	88							5,000	88	600	9
Halibut, fresh			670	58	364	45	634	53	671	44	26,751	2,116	220,126	14,186
Halibut, salted											15,895	892	4,290	348
Mackerel, fresh	1,802,615	32,866	749,268	20,212	343,740	19,613	351,465	23,222	296,075	21,765	7,103,273	174,353	13,549,499	177,102
Mackerel, salted	180,750	6,646	19,117	759							289,622	9,381	234,012	6,370
Flounders, fresh	40,665	1,598	53,535	2,503	129,839	4,643	105,683	4,072	128,564	4,020	837,065	29,657	385,428	11,821
Swordfish, fresh											1,486	439		
Wolffish, fresh	2,165	49	1,655	33	2,833	51	295	7	2,285	35	68,405	1,385	185,103	2,057
Rosefish, fresh	1,931,228	28,032	2,210,086	35,196	3,181,353	49,166	2,032,572	26,968	1,658,986	20,366	17,093,898	242,636	2,895,858	32,807
Herring, fresh					1,750	16					1,750	16		
Herring, frozen											276,690	5,534		
Herring, salted											321,804	9,678	1,682,058	52,708
Other, fresh	1,173,384	16,797	417,709	7,128	202,843	4,546	101,599	2,613	66,575	1,404	3,109,323	60,750	264,185	2,955
Total, fresh	6,285,939	110,706	5,832,693	121,529	7,938,466	158,026	9,832,542	162,916	6,471,980	117,779	57,062,927	1,101,099	46,931,486	806,788
Total, frozen											276,690	5,534		
Total, salted	252,418	8,563	246,407	8,240	244,872	7,593					2,073,917	65,048	4,333,023	128,203
Grand total	6,538,357	119,269	6,079,100	129,769	8,183,338	165,619	9,832,542	162,916	6,471,980	117,779	59,413,534	1,171,681	51,264,509	934,991
Landed in 1935:														
Fresh	5,565,335	67,512	5,075,422	81,798	6,914,615	148,063	5,262,805	95,890	2,707,685	60,678			46,931,486	806,788
Salted	369,586	11,210	634,891	17,914	492,072	14,373			1,412,459	43,593			4,333,023	128,203
Total	5,934,921	78,722	5,710,313	99,712	7,406,687	162,436	5,262,805	95,890	4,120,144	104,271			51,264,509	934,991

Landings by fishing vessels at the three principal New England ports, 1936—Continued

PORTLAND: By months

Species	January		February		March		April		May		June		July	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:														
Large	46,865	$2,064	62,002	$3,141	87,099	$2,660	267,375	$5,794	393,756	$7,216	517,675	$12,721	420,458	$10,714
Market	22,003	608	30,653	1,153	51,780	1,393	281,407	5,295	210,848	3,844	388,365	7,296	6,623	99
Scrod	155	1	165	1	460	4	195	3	45		140		330	3
Haddock, fresh:														
Large	86,236	5,000	71,453	3,918	78,807	3,453	833,570	16,880	1,500,917	29,509	510,669	12,096	85,222	3,180
Scrod	8,374	167	10,085	200	7,990	147	40,627	664	159,210	3,024	250,908	4,700	5,323	76
Hake, fresh:														
Large	104,953	3,926	93,795	4,805	78,399	3,013	87,479	2,626	179,002	2,656	339,535	5,694	302,518	5,239
Small	190	2	828	18	2,585	47	4,880	54	6,820	66	489	2	535	3
Pollock, fresh	49,194	1,030	199,813	5,532	146,438	3,051	227,338	3,458	333,041	4,215	119,447	1,685	74,536	1,009
Cusk, fresh	92,717	3,006	143,192	5,929	249,762	6,841	269,490	5,139	119,260	1,707	64,158	1,190	24,796	494
Halibut, fresh	559	104	908	175	1,085	195	6,516	657	33,644	2,534	17,140	960	141	22
Mackerel, fresh											40,375	953	68,568	1,741
Flounders, fresh	16,175	559	4,011	104	21,410	659	110,440	1,709	148,635	1,745	167,396	3,494	138,655	3,430
Swordfish, fresh													14,974	2,668
Wolffish, fresh	215	4	12,370	155	490	6	8,875	89	22,757	215	6,109	59	2,886	25
Rosefish, fresh	7,680	80	1,425	15	32,885	306	6,766	71	10,922	77	535		410	4
Herring, fresh											40		40	1
Other, fresh	9,369	204	7,461	169	13,084	284	1,586	54	3,299	85	9,764	151	19,336	299
Total, fresh	444,685	16,755	638,161	25,315	772,274	22,059	2,146,544	42,493	3,122,156	56,893	2,432,745	51,001	1,162,351	29,007
Landed in 1935:														
Fresh	226,953	10,082	656,879	18,822	1,155,898	29,352	3,895,319	76,213	2,074,217	34,838	1,026,877	25,656	1,235,926	32,144

Species	August		September		October		November		December		Total, 1936		1935	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:														
Large	108,001	$4,794	113,511	$6,151	59,819	$2,841	30,834	$1,319	41,935	$1,469	2,149,330	$60,884	3,171,397	$80,335
Market	14,314	320	32,360	755	34,796	971	25,466	774	32,024	851	1,130,639	23,359	775,335	14,872
Scrod	260	2	205	2	275	6	1,770	27	585	7	4,585	56	41,176	705
Cod, salted, large	5,180	168									5,180	168		
Haddock, fresh:														
Large	99,941	4,117	101,094	4,482	66,643	3,542	98,143	6,022	104,074	5,901	3,636,769	98,100	3,864,640	94,414
Scrod	3,405	63	5,690	90	2,830	54	5,873	130	2,844	54	503,159	9,369	552,643	9,636
Hake, fresh:														
Large	378,515	6,115	285,530	5,897	213,675	5,410	81,618	2,967	169,573	4,833	2,314,592	53,181	2,245,357	43,891
Small	27,360	284	9,490	90	4,607	47	5,550	183	11,135	227	74,469	1,023	16,610	190
Hake, salted, large	2,030	20									2,030	20		
Pollock, fresh	129,660	2,213	808,450	12,034	710,136	10,664	221,274	3,132	80,695	1,239	3,100,022	49,262	848,256	9,086
Cusk, fresh	40,478	856	32,158	761	69,403	1,936	58,447	1,889	144,669	3,666	1,308,530	33,414	1,467,293	31,553
Cusk, salted	4,500	72									4,500	72		
Halibut, fresh	28,844	3,124	1,004	106	3,307	363	795	100	1,160	218	95,103	8,558	84,677	9,881
Mackerel, fresh	67,532	2,111	20,846	1,012	56,334	3,993	13,287	1,006			263,942	10,816	46,738	967
Mackerel, salted													3,450	34
Flounders, fresh	97,072	3,265	15,684	605	13,937	545	20,461	671	50,940	1,492	804,816	18,278	516,261	11,534
Swordfish, fresh	19,189	2,891	11,541	2,891							45,704	8,450	119,330	19,870
Wolffish, fresh	190	1	1,362	21	201	3	1,635	32	40		57,130	610	53,116	536
Rosefish, fresh	835	8			2,761	35	5,065	68	9,363	111	78,647	775	70,365	592
Herring, fresh	39,160	356					34,100	217			73,340	574	88,135	472
Other, fresh	235,801	3,114	75,880	970	46,365	640	26,874	360	27,541	450	476,360	6,780	517,143	8,351
Total, fresh	1,290,557	33,634	1,514,805	35,867	1,285,089	31,050	631,192	18,897	676,578	20,518	16,117,137	383,489	14,478,472	336,885
Total, salted	11,710	260									11,710	260	3,450	34
Grand total	1,302,267	33,894	1,514,805	35,867	1,285,089	31,050	631,192	18,897	676,578	20,518	16,128,847	383,749	14,481,922	336,919
Landed in 1935:														
Fresh	1,704,785	39,692	865,599	23,814	861,777	21,373	499,544	16,083	274,698	9,416			14,478,472	336,885
Salted	3,450	34											3,450	34
Total	1,708,235	39,726	865,599	23,814	861,777	21,373	499,544	16,083	274,698	9,416			14,481,922	336,919

Landings by fishing vessels at the three principal New England ports, 1936—Continued

SUMMARY: By ports

Species	Boston		Gloucester		Portland		Total, 1936		1935	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod, fresh:										
Large	29, 516, 328	$911, 858	4, 870, 209	$137, 250	2, 149, 330	$60, 884	36, 535, 867	$1, 109, 992	42, 469, 269	$1, 119, 703
Market	35, 923, 029	955, 794	1, 683, 419	38, 682	1, 130, 639	23, 359	38, 737, 087	1, 017, 835	42, 409, 690	890, 063
Scrod	4, 415, 985	90, 523	245, 052	5, 306	4, 585	56	4, 665, 622	95, 885	805, 496	17, 463
Cod, salted:										
Large	1, 020	33	907, 151	30, 498	5, 180	168	913, 351	30, 699	1, 246, 989	41, 665
Market	135	3	443, 757	12, 710			443, 892	12, 713	976, 184	24, 403
Scrod			84, 598	1, 693			84, 598	1, 693	184, 102	2, 655
Haddock, fresh:										
Large	97, 592, 853	3, 306, 586	3, 128, 911	89, 363	3, 636, 769	98, 100	104, 358, 533	3, 494, 049	107, 673, 518	2, 845, 649
Scrod	38, 171, 456	937, 613	845, 602	19, 642	503, 159	9, 369	39, 520, 217	966, 624	49, 322, 213	1, 031, 894
Haddock, salted:										
Large			2, 510	50			2, 510	50	6, 088	92
Scrod									60	4
Hake, fresh:										
Large	7, 997, 861	229, 838	701, 062	15, 425	2, 314, 592	53, 181	11, 013, 515	298, 444	9, 865, 004	227, 416
Small	794, 610	24, 157	49, 415	916	74, 469	1, 023	918, 494	26, 096	719, 511	17, 682
Hake, salted:										
Large	75	1	2, 720	48	2, 030	20	4, 825	69	2, 080	46
Small									855	21
Pollock, fresh	14, 159, 809	335, 768	17, 145, 965	280, 339	3, 100, 022	49, 262	34, 405, 796	665, 369	27, 884, 162	532, 616
Pollock, salted			860	10			860	10	805	17
Cusk, fresh	5, 800, 667	132, 083	151, 341	2, 824	1, 308, 530	33, 414	7, 260, 538	168, 321	5, 523, 660	109, 519
Cusk, salted			5, 000	88	4, 500	72	9, 500	160	600	9
Halibut, fresh	2, 059, 883	218, 067	26, 751	2, 116	95, 103	8, 558	2, 181, 737	228, 741	2, 341, 070	229, 479
Halibut, salted			15, 895	892			15, 895	892	4, 290	348
Mackerel, fresh	21, 012, 706	595, 073	7, 103, 273	174, 353	263, 942	10, 816	28, 379, 921	780, 242	40, 610, 473	718, 164
Mackerel, salted	865	24	289, 622	9, 381			290, 487	9, 405	237, 462	6, 404
Flounders, fresh	13, 880, 564	554, 429	837, 065	29, 657	804, 816	18, 278	15, 522, 445	602, 364	14, 401, 332	459, 586
Swordfish, fresh	1, 195, 520	251, 655	1, 486	439	45, 704	8, 450	1, 242, 710	260, 544	2, 143, 529	379, 279
Wolffish, fresh	1, 920, 081	46, 755	68, 405	1, 385	57, 130	610	2, 045, 616	48, 750	2, 286, 789	52, 179
Rosefish, fresh	49, 419, 014	720, 231	17, 093, 898	242, 636	78, 647	775	66, 591, 559	963, 642	17, 110, 497	183, 704
Herring, fresh	400	6	1, 750	16	73, 340	574	75, 490	596	92, 135	497
Herring, frozen			276, 690	5, 534			276, 690	5, 534		

Herring, salted			321,804	9,678			321,804	9,678	1,682,058	52,708
Other, fresh	15,361,903	277,618	3,109,323	60,750	476,360	6,780	[1] 18,947,586	[1] 345,148	3,118,472	61,387
Total, fresh	339,222,669	9,588,054	57,062,927	1,101,099	16,117,137	383,489	412,402,733	11,072,642	368,776,820	8,876,280
Total, frozen			276,690	5,534			276,690	5,534		
Total, salted	2,095	61	2,073,917	65,048	11,710	260	2,087,722	65,369	4,341,573	128,372
Grand total	339,224,764	9,588,115	59,413,534	1,171,681	16,128,847	383,749	414,767,145	11,143,545	373,118,393	9,004,652
Landed in 1935:										
Fresh	307,366,862	7,732,607	46,931,486	806,788	14,478,472	336,885			368,776,820	8,876,280
Salted	5,100	135	4,333,023	128,203	3,450	34			4,341,573	128,372
Total	307,371,962	7,732,742	51,264,509	934,991	14,481,922	336,919			373,118,393	9,004,652

[1] The items under "Other, fresh" include alewives, 278,930 pounds, value $2,574; bluefish, 500 pounds, value $30; butterfish, 209,914 pounds, value $15,129; cunner (perch), 1,250 pounds, value $36; eels, 400 pounds, value $15; herring smelt, 41,895 pounds, value $1,293; salmon, 308 pounds, value $45; scup, 44,200 pounds, value $587; sea bass, 206 pounds, value $21; shad, 66,441 pounds, value $2,028; sharks, 58,424 pounds, value $1,652; skates, 30,280 pounds, value $609; squeteagues or "sea trout," 30 pounds, value $3; sturgeon, 2,414 pounds, value $217; tuna or "horse mackerel," 23,537 pounds, value $1,168; whiting, 17,666,933 pounds, value $297,435; mixed fish, 39,875 pounds, value $695; lobsters, 3 pounds, value $1; shrimp, 1,430 pounds, value $119; squid, 5,655 pounds, value $161; livers, 342,097 pounds, value $14,321; sounds, 20 pounds, value $1; spawn, 132,639 pounds, value $7,005; and tongues, 202 pounds, value $2.

BIOLOGICAL ASPECT

In 1936 the fishing fleet landing fares at Boston and Gloucester, Mass., and Portland, Maine, and operating on the fishing banks of the North Atlantic, numbered 392 steam, motor, and sail vessels of 5 net tons capacity or greater as measured by the United States Customs Service. These vessels were absent from port 55,309 days. The catch of edible fish landed at the three ports amounted to 416,384,118 pounds when the salted fish had been converted to the basis of fresh gutted or round fish as usually landed. This, however, does not represent the entire catch of edible fish of these vessels, for landings were also made at ports in New England other than these three, at New York City, and at more southern ports in connection with the southern winter trawl and mackerel fisheries.

Otter trawls on all sizes of vessels accounted for 309,551,194 pounds, or 74 percent of the total landings. Line trawls were next in importance, accounting for 49,714,305 pounds, or 12 percent of the total landings.

The catch taken off New England and landed at the three ports amounted to 264,212,798 pounds, or 64 percent of the total; that off Nova Scotia 146,939,445 pounds, or 35 percent; off the east coast of Newfoundland 4,086,552 pounds, or 1 percent; and that off the Middle Atlantic States 1,145,323 pounds, or less than one-half of 1 percent.

Landings by fishing vessels at the three principal New England ports, 1936

BY GEAR AND FISHING AREAS

Gear and fishing areas	Vessels fishing	Trips	Days absent	Cod			Haddock		Hake	
				Large	Market	Scrod	Large	Scrod	Large	Small
Line trawls:	*Number*	*Number*	*Number*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
East Coast of Newfoundland, unclassified	1	1	27	16,213	5,217					
Off Newfoundland	3	4	166	491,154	734,295	150,988	5,171		1,482	
Gulf of St. Lawrence, unclassified	5	12	339	974,199	114,384	25,904			8,000	
St. Pierre Bank (St. Peters)	2	3	65	13,342	10,270		6,160		9,357	
Newfoundland Banks, unclassified	1	2	42	54,415	8,070				600	
Northeast Cape Breton	1	2	31	106,500	87,300		5,000		52,250	
Banquereau	9	17	317	146,086	34,951	333	20,115	22,885	49,713	
Canso	2	2	18	15,700	12,350		35,000	3,100	16,800	
Middle Ground	1	1	7	5,700	7,750		3,650	300	3,600	
Northeast Sable Island Bank	5	5	52	98,175	43,410	300	29,095	23,800	3,755	
Southeast Sable Island Bank	3	3	40	7,610	4,600		30,500	1,200	39,570	
Horseshoe Ground	3	4	36	44,790	54,300		37,760	1,200	100,925	
Southwest Sable Island Bank	2	3	23	41,082	26,508		82,034	9,090	4,810	
East Nova Scotia	3	3	32	30,140	27,940		17,100		23,920	
Emerald Bank	8	13	116	225,653	122,127	2,500	418,436	45,620	73,730	
Central Nova Scotia	3	3	29	76,180	50,320	3,400	3,990	200	44,980	
La Have Bank (including Sambro Bank)	23	62	561	839,673	763,193	6,400	561,310	56,090	693,475	
Southern Nova Scotia	26	73	735	696,267	721,555	8,170	1,261,562	117,645	505,900	
Browns Bank	28	211	2,007	2,562,508	2,189,149	16,028	4,283,808	407,989	1,128,459	
Western Nova Scotia	20	60	551	275,215	323,629	11,399	1,096,974	160,749	647,213	
Southern Bay of Fundy	4	4	28	7,995	7,380		42,320	3,990	27,860	650
Nova Scotia, unclassified	6	9	110	152,880	100,515	2,500	98,760	4,400	104,520	
Eastern Maine	1	2	12	1,860	385	15	1,720		53,635	
Central Maine	23	165	832	159,953	61,930	1,462	148,066	11,032	2,062,698	36,620
Western Maine	25	164	293	48,053	16,541	800	67,582	6,043	205,367	48,000
Eastern Massachusetts	44	693	1,469	548,075	404,721	53,280	310,295	6,150	35,905	222,455
Eastern Massachusetts (occasional)				100	100		900			
Inner Grounds	53	252	975	473,226	235,483	2,828	666,347	34,790	1,244,621	69,465
Northern Gulf of Maine, unclassified	1	1	8	73,000	10,275		26,200			
Western Side South Channel	29	110	602	412,371	577,465	5,455	1,602,660	40,053	150,772	13,250
Eastern Side South Channel	15	23	128	99,533	59,314	1,490	296,435	1,607	148,590	135
Northern Edge of Georges	13	17	100	348,082	194,730		240,785	32,050	21,570	
Northeast Peak of Georges	7	13	122	336,253	145,917	1,000	114,980	9,160	22,150	
Central Georges	5	6	43	258,850	26,650		51,725		36,350	
Southeast Georges	10	13	97	293,117	45,782		137,758	9,750	7,195	
Southwest Georges	3	7	57	262,715	35,695		83,233	1,000	5,000	

Landings by fishing vessels at the three principal New England ports, 1936—Continued

BY GEAR AND FISHING AREAS—Continued

Gear and fishing areas	Vessels fishing	Trips	Days absent	Cod			Haddock		Hake	
				Large	Market	Scrod	Large	Scrod	Large	Small
Line trawls—Continued.	*Number*	*Number*	*Number*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Lightship Grounds	1	1	4	1,415	1,200	2,000	18,100			
Nantucket Shoals	4	4	30	28,865	39,485		34,250	5,235	16,490	7,170
Southern Gulf of Maine, unclassified	8	9	97	157,403	49,200		82,510	3,850	27,225	
Total	[1] 104	1,977	10,201	10,384,348	7,354,086	296,252	11,922,291	1,018,978	7,578,487	397,745
Hand lines:										
Central Maine (occasional)				10					525	
Western Maine (occasional)				55						
Western Side South Channel	2	3	14	5,840	8,110		80			
Southeast Georges	1	1	6	18,660	3,450					
Nantucket Shoals	1	1	8	4,545	1,760					
Total	[1] 2	5	28	29,110	13,320		80		525	
Harpoons:										
Northeast Cape Breton	20	20	351							
Banquereau	1	1	2							
Canso	2	2	50							
Northeast Sable Island Bank	4	4	61							
Horseshoe Ground	1	1	18							
Eastern Nova Scotia	2	2	10							
Central Nova Scotia	1	1	8							
Browns Bank	41	80	1,405							
Nova Scotia, unclassified	11	11	269							
Central Maine	1	1	36							
Western Maine	2	10	13							
Northern Gulf of Maine, unclassified	1	1	22							
Western Side South Channel	2	2	8							
Eastern Side South Channel	1	1	14							
Northern Edge of Georges	1	1	5							
Northeast Peak of Georges	10	10	66							
Central Georges	1	1	4							
Southeast Georges	9	10	97							
Southwest Georges	6	6	27							
Lightship Grounds	6	6	27							
Nantucket Shoals	5	5	36							

Southern New England, Offshore Grounds	9	9	113								
Southern Gulf of Maine, unclassified	28	34	536								
South	7	7	57								
Total	[1] 46	226	3,235								
Otter trawls, large:											
Banquereau	41	130	1,323	1,356,839	7,000,415	780,224	2,930,732	2,464,251	30,608		
Canso	2	2	18	2,300	1,750		200,000	9,500	8,400		
Middle Ground	21	33	246	385,277	491,944	27,740	1,229,086	148,343	29,460	5,750	
Northeast Sable Island Bank	27	67	562	566,376	799,043	102,290	2,988,879	644,870	38,686		
Southeast Sable Island Bank	12	14	107	218,916	384,254	2,590	313,690	51,625	13,860		
Horseshoe Ground	54	236	2,044	3,139,147	2,276,592	103,310	11,993,950	1,290,860	470,062	1,020	
Southwest Sable Island Bank	41	97	771	2,289,273	2,038,700	30,013	3,688,836	565,356	64,470		
Eastern Nova Scotia	3	4	35	30,140	45,060	5,240	280,860	60,080	5,975		
Emerald Bank	56	195	1,483	2,577,046	2,379,619	47,997	11,335,106	1,444,939	227,724	680	
Central Nova Scotia	3	3	11	11,755	15,990	9,400	36,690	16,896	900		
La Have Bank (including Sambro Bank)	24	37	228	147,075	279,112	6,875	3,222,833	315,095	52,842		
Southern Nova Scotia	24	81	552	347,588	162,630	16,540	309,435	47,300	52,045		
Browns Bank	45	157	933	810,758	936,890	110,751	4,203,770	1,342,741	72,088		
Western Nova Scotia	1	1	3	75	120	150	6,510	4,500	480		
Nova Scotia, unclassified	24	35	358	397,615	523,925	82,335	1,066,330	297,908	32,365	80	
Central Maine	1	1	11	33,100	105,500		23,800	34,000			
Eastern Massachusetts	3	3	9	595	175		11,500	1,265			
Inner Grounds	7	19	119	56,015	109,353	4,400	292,652	83,000	4,870		
Western Side South Channel	32	181	1,030	209,933	161,057	9,940	1,087,078	284,952	64,135		
Eastern Side South Channel	34	103	545	278,945	356,126	22,598	2,531,401	1,184,015	140,853		
Northern Edge of Georges	48	279	1,723	1,360,238	3,481,205	694,960	6,779,676	4,976,155	190,672	1,168	
Northeast Peak of Georges	57	417	3,109	4,072,383	5,174,145	1,454,998	14,560,031	10,349,077	232,497	932	
Central Georges	40	149	920	456,902	823,676	86,152	4,418,053	3,762,871	26,054		
Southeast Georges	42	91	525	817,721	520,446	162,457	2,307,120	2,043,742	53,822		
Southwest Georges	25	38	270	87,371	53,750	1,980	1,699,769	1,109,852	9,119		
Lightship Grounds	1	1	3	1,520	1,200	400	6,520	3,808	120		
Nantucket Shoals	1	1	5	7,900	19,625		26,200	10,925	220		
Southern Gulf of Maine, unclassified	25	39	370	195,295	289,010	181,870	977,265	704,839	27,685		
Total	[1] 61	2,414	17,313	19,858,098	28,431,312	3,945,210	78,527,772	33,252,765	1,850,012	9,630	
Otter trawls, medium:											
Banquereau	2	3	35	38,140	165,400	35,900	97,550	67,290	520		
Canso	1	1	4	750	950		6,750	2,475	600		
Northeast Sable Island Bank	2	2	17	18,170	8,270		14,740	4,180			
Horseshoe Ground	4	7	57	36,230	38,620		505,080	73,520	10,260		
Southwest Sable Island Bank	3	4	22	93,675	48,870	600	93,960	13,865	2,200		
Emerald Bank	7	13	100	55,020	62,820	3,160	685,055	92,415	12,135		
Central Nova Scotia	1	1	8	9,900	15,896	5,490	22,860	19,170	3,420		
La Have Bank (including Sambro Bank)	2	2	13	1,600	3,650		56,000	23,750	1,000		
Southern Nova Scotia	15	38	292	80,490	44,315	340	48,105	7,485	62,025		
Browns Bank	12	46	342	253,480	269,655	42,075	1,604,630	425,190	19,716		

[1] Exclusive of duplication.

Landings by fishing vessels at the three principal New England ports, 1936—Continued

BY GEAR AND FISHING AREAS—Continued

Gear and fishing areas	Vessels fishing	Trips	Days absent	Cod			Haddock		Hake	
				Large	Market	Scrod	Large	Scrod	Large	Small
Otter trawls, medium—Continued.	*Number*	*Number*	*Number*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Western Nova Scotia	5	5	31	14,110	14,196	2,110	38,650	17,100	12,510	----------
Nova Scotia, unclassified	3	3	35	24,960	14,160	1,750	28,350	4,550	4,675	----------
Central Maine	10	22	127	4,360	12,490	200	42,675	5,220	17,225	49,920
Western Maine	19	52	183	16,230	9,930	1,400	29,115	1,610	9,900	51,905
Eastern Massachusetts	51	461	1,456	115,954	123,483	16,130	113,304	12,672	37,440	85,185
Inner Grounds	33	80	275	32,535	29,216	3,680	59,780	22,159	22,085	33,465
Western Side South Channel	65	458	2,713	398,197	388,139	16,253	1,818,714	498,429	213,314	19,720
Eastern Side South Channel	33	78	494	177,583	158,715	3,985	1,339,259	519,825	40,209	470
Northern Edge of Georges	17	68	420	344,920	548,033	126,490	1,243,789	727,770	26,911	----------
Northeast Peak of Georges	16	49	315	310,400	434,390	149,640	1,282,815	913,980	21,684	----------
Central Georges	24	119	858	630,413	421,190	56,775	2,445,463	1,221,749	9,295	----------
Southeast Georges	17	31	182	268,587	98,455	20,525	438,562	221,270	10,785	----------
Southwest Georges	14	17	113	41,277	18,485	450	400,720	158,990	3,860	----------
Lightship Grounds	4	4	21	1,395	900	----------	18,800	6,310	1,400	----------
Nantucket Shoals	5	5	22	4,570	22,400	----------	32,740	7,540	----------	----------
Southern New England, Offshore Grounds	1	1	3	----------	335	----------	----------	----------	135	----------
Southern Massachusetts	2	2	11	200	400	----------	100	----------	75	500
Southern Gulf of Maine, unclassified	21	57	397	61,350	53,050	11,425	220,758	120,505	21,350	1,745
Total	[1] 99	1,629	8,546	3,034,496	3,006,413	498,378	12,688,324	5,189,019	564,729	242,910
Otter trawls, small:										
Southeast Sable Island Bank	1	3	28	9,555	1,255	----------	3,745	4,280	----------	1,090
Southern Nova Scotia	1	2	14	4,270	820	----------	900	----------	----------	710
Eastern Maine	3	3	13	1,155	175	----------	12,635	535	4,700	200
Central Maine	21	109	514	46,505	14,666	295	253,532	8,481	92,820	37,865
Western Maine	35	198	512	32,870	16,259	1,600	93,636	2,715	56,385	44,797
Eastern Massachusetts	77	1,412	4,208	293,155	251,760	32,820	266,895	16,249	45,992	128,485
Inner Grounds	30	68	225	29,300	16,760	4,845	39,680	740	2,410	15,440
Western Side South Channel	51	221	808	109,435	74,257	29,180	203,885	25,100	21,378	23,150
Eastern Side South Channel	1	1	4	250	75	----------	----------	----------	625	----------
Lightship Grounds	1	2	6	----------	----------	----------	----------	----------	----------	----------
Nantucket Shoals	5	8	26	1,200	3,000	135	525	----------	680	----------
Southern Massachusetts	1	1	3	----------	100	----------	----------	----------	----------	----------
Total	[1] 97	2,028	6,361	527,695	379,127	68,875	875,433	58,100	224,990	251,737

Sink gill nets:										
Central Maine	4	5	7	3,780	1,110		575		12,655	420
Western Maine	19	1,274	1,283	1,367,616	136,020	695	119,587	210	400,142	2,769
Eastern Massachusetts	37	3,623	3,623	3,064,196	275,383	23,715	229,637	1,145	389,872	13,265
Inner Grounds	17	253	253	1,805	515		5		20	18
Nantucket Shoals	1	1	1							
Total	[1] 44	5,156	5,167	4,437,397	413,028	24,410	349,804	1,355	802,689	16,472
Drift gill nets:										
Bay of Islands	1	1	23							
Off Newfoundland	1	1	24							
Eastern Massachusetts	23	128	223		430				1,250	
Western Side South Channel	9	51	51							
Total	[1] 26	181	321		[2] 430				[2] 1,250	
Purse seines:										
Northeast Sable Island Bank	1	1	11							
Browns Bank	1	1	5							
Central Maine	21	45	164		200					
Western Maine	14	56	94	40	70					
Eastern Massachusetts	73	649	1,702	50						
Inner Grounds	15	17	47							
Western Side South Channel	47	127	418		250					
Eastern Side South Channel	16	18	52							
Lightship Grounds	54	189	771							
Nantucket Shoals	28	36	130							
Southern New England, offshore grounds	49	147	540							
Southern Massachusetts	8	9	26							
Rhode Island	1	1	3							
Southern Gulf of Maine, unclassified	3	3	11							
South	24	30	163							
Total	[1] 83	1,329	4,137	[2] 90	[2] 520					
Grand total	[1] 392	14,945	55,309	38,271,234	39,598,236	4,833,125	104,363,704	39,520,217	11,022,682	918,494

[1] Exclusive of duplication.

[2] Incidental catch.

NOTE.—The three principal New England ports are Boston and Gloucester, Mass., and Portland, Maine. Otter trawls are classified according to the size of the vessel. The weight of salted fish landed has been converted to the equivalent of fresh fish as landed. Only landings by vessels having a capacity of 5 net tons or greater are used in this tabulation. "Occasional" after the name of a bank or ground indicates that the vessel or vessels contributing to the catch as shown fished chiefly with another type of gear. In such cases the number of vessels fishing, number of trips, and number of days absent, are shown under the principal type of gear used. A trip is shown for each area in which a vessel operated on each voyage. Consequently several trips may be shown for a single voyage.

Landings by fishing vessels at the three principal New England ports, 1936—Continued

BY GEAR AND FISHING AREAS—Continued

Gear and fishing areas	Pollock	Cusk	Halibut	Mackerel	Flounders	Swordfish	Wolffish	Rosefish	Herring	Other	Total
Line trawls:	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
East Coast of Newfoundland, unclassified			48,667							981	71,078
Off Newfoundland									112,050		1,495,140
Gulf of St. Lawrence, unclassified	175	6,170	304,944							7,409	1,441,185
St. Pierre Bank (St. Peters)		8,550	60,939								108,618
Newfoundland Banks, unclassified			125,250							1,470	189,805
Northeast Cape Breton	200	200	80								251,530
Banquereau	87	15,565	531,702							1,463	822,900
Canso	1,550	16,100	1,371								101,971
Middle Ground	200	2,250	50								23,500
Northeast Sable Island Bank	1,200	8,825	4,610				125				213,295
Southeast Sable Island Bank	300	38,440	20,327							686	143,233
Horseshoe Ground	5,120	33,285	2,628		2,460		7,175				289,643
Southwest Sable Island Bank	6,674	1,410	2,788				732				175,128
Eastern Nova Scotia	370	20,580	533				300				120,883
Emerald Bank	19,306	30,760	10,572		9,840		17,668				976,212
Central Nova Scotia	300	17,210	1,255				100				197,935
La Have Bank (including Sambro Bank)	93,238	654,620	56,336			290	41,355			840	3,766,820
Southern Nova Scotia	109,765	807,090	18,121		2,180		81,295				4,329,550
Browns Bank	193,755	1,608,583	288,153	1,500	419	2,326	100,114			6,150	12,788,941
Western Nova Scotia	58,273	346,558	18,278				15,866			20	2,954,174
Southern Bay of Fundy	4,635	8,820	741				1,250			3,000	108,641
Nova Scotia, unclassified	10,480	94,710	4,505				3,025				576,295
Eastern Maine		2,660									60,275
Central Maine	45,560	643,005	1,394		285		569	600		24,759	3,197,933
Western Maine	14,116	114,953	1,855		415		635	475		10,231	535,066
Eastern Massachusetts	252,810	88,245	2,733	24,590	24,710		78,500	4,800		35,645	2,092,914
Eastern Massachusetts (occasional)	400	100									1,600
Inner Grounds	73,857	1,914,954	7,510		173		1,845	160		37,342	4,762,601
Northern Gulf of Maine, unclassified	600		142								110,217
Western Side South Channel	136,845	74,207	12,428		5,705		13,255	461,718		17,410	3,523,594
Eastern Side South Channel	8,750	149,093	3,236		275		500	65,950		845	835,753
Northern Edge of Georges	22,455	36,480	4,020				1,630				901,802
Northeast Peak of Georges	17,133	21,290	24,452				785			330	693,450
Central Georges	1,650	16,550	347								392,122
Southeast Georges	6,123	21,915	766				150				522,556
Southwest Georges	2,190	2,000	119								391,952
Lightship Grounds	900		56								23,671
Nantucket Shoals	4,115	10,535	302				465				146,912

Southern Gulf of Maine, unclassified	3,650	49,150	1,247				1,175				375,410
Total	1,096,782	6,864,863	1,562,457	[1] 26,090	46,462	[1] 2,616	368,514	533,703	[1] 112,050	148,581	49,714,305
Hand lines:											
Gulf of St. Lawrence, unclassified (occasional)				108,000							108,000
Central Maine (occasional)	10	25									570
Western Maine (occasional)											55
Eastern Massachusetts (occasional)										5,800	5,800
Western Side South Channel	350										14,380
Southeast Georges	1,000		63								23,173
Nantucket Shoals	400										6,705
Total	1,760	25	63	108,000						5,800	158,683
Harpoons:											
Northeast Cape Breton						137,439					137,439
Banquereau						704					704
Banquereau (occasional)						615					615
Canso						7,095				83	7,178
Northeast Sable Island Bank						35,212					35,212
Horseshoe Ground						16,985					16,985
Horseshoe Ground (occasional)						2,609					2,609
Eastern Nova Scotia						6,298					6,298
Central Nova Scotia						2,876					2,876
Browns Bank						629,394					629,394
Browns Bank (occasional)						9,338					9,338
Nova Scotia, unclassified						91,238					91,238
Central Maine						2,283				58	2,341
Western Maine						1,073				5,067	6,140
Northern Gulf of Maine, unclassified						5,053					5,053
Western Side South Channel						2,020					2,020
Western Side South Channel (occasional)						480					480
Eastern Side South Channel						5,877					5,877
Northern Edge of Georges						2,689					2,689
Northeast Peak of Georges						25,416					25,416
Central Georges						2,688					2,688
Southeast Georges						34,070					34,070
Southwest Georges						8,883					8,883
Lightship Grounds						6,847					6,847
Lightship Grounds (occasional)						1,346					1,346
Nantucket Shoals						9,206					9,206
Southern New England, Offshore Grounds						29,902					29,902
Southern Gulf of Maine, unclassified						148,854					148,854
South						13,538					13,538
Total						1,240,028				5,208	1,245,236

[1] Incidental catch.

Landings by fishing vessels at the three principal New England ports, 1936—Continued

BY GEAR AND FISHING AREAS—Continued

Gear and fishing areas	Pollock	Cusk	Halibut	Mackerel	Flounders	Swordfish	Wolffish	Rosefish	Herring	Other	Total
Otter trawls, large:	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Banquereau	227,862	5,670	49,322		440,105		17,301	220,617		240	15,524,186
Canso	1,350	100	2,570		40,150		1,550				267,670
Middle Ground	84,919	2,224	15,285		151,133		18,471			3,020	2,592,652
Northeast Sable Island Bank	286,430	2,973	24,450	626	246,798		10,446	16,050		1,747	5,729,664
Southeast Sable Island Bank	66,561	1,353	14,230		124,684		30,293	12,054		560	1,234,670
Horseshoe Ground	1,226,421	35,970	106,790	466	2,593,049		226,759	255,824		11,540	23,731,760
Southwest Sable Island Bank	728,246	3,681	92,050		203,460		224,296	33,586		1,241	9,963,208
Eastern Nova Scotia	33,860	1,280	5,173		29,360		10,240				507,268
Emerald Bank	1,105,287	26,716	100,092		532,866		283,177	46,840		9,222	20,117,311
Central Nova Scotia	2,230		386		1,438		987	1,610			98,282
La Have Bank (including Sambro Bank)	113,295	5,726	10,273		50,081		13,967	138,635		179	4,355,988
Southern Nova Scotia	67,435	550	6,659		390,308		99,983	7,440,341		192	8,941,006
Browns Bank	655,673	20,078	19,900		314,975		104,551	3,300,669		9,811	11,902,655
Western Nova Scotia	180	240	40		258					6	12,559
Nova Scotia, unclassified	163,040	3,366	10,441		153,560		21,541	289,630		37	3,042,173
Central Maine	500		225								197,125
Eastern Massachusetts	107		10		58		65	98,120			111,895
Inner Grounds	57,920	1,080	6,506		5,915		125	1,270,449		50	1,892,335
Western Side South Channel	239,944	39,708	6,532		284,426		17,173	14,471,200		31,822	16,907,900
Eastern Side South Channel	182,287	5,738	7,669	50	311,581		11,175	1,839,130		277,490	7,149,058
Northern Edge of Georges	1,263,674	38,461	26,748	16,734	690,103		53,995	230,568		71,570	19,875,927
Northeast Peak of Georges	2,837,134	91,491	50,614	17,515	471,899		122,172	208,418		53,418	39,696,724
Central Georges	302,978	1,914	17,880	3,398	799,494		29,134	13,750		31,638	10,773,894
Southeast Georges	160,708	2,587	8,378	300	183,275		13,432	167,855		4,816	6,446,659
Southwest Georges	87,905	13,480	1,719		54,958		4,475	37,402		26,472	3,188,252
Lightship Grounds	240		35		2,330		20				16,193
Nantucket Shoals	7,650				50		950				73,520
Southern Gulf of Maine, unclassified	248,655	5,369	3,019	11,744	77,860		9,095	413,647		10,460	3,155,813
Total	10,152,491	309,755	586,996	[2] 50,833	8,154,174		1,325,373	30,506,395		545,531	217,506,347
Otter trawls, medium:											
Banquereau	1,280		2,380		19,420		360			350	428,590
Canso	150				600			33,017			45,292
Northeast Sable Island Bank	120	5,880	1,315		9,800						62,475
Horseshoe Ground	24,120	1,455	5,139		70,567		6,860	7,300		560	779,711
Southwest Sable Island Bank	16,900	585	640		23,355		2,875			240	297,765
Emerald Bank	41,690	1,105	3,291		33,075		11,292	29,010			1,030,068
Central Nova Scotia	225			180	1,845		225	2,025			81,236
La Have Bank (including Sambro Bank)	1,150	200	223		[1] 7,125		200				94,898

Southern Nova Scotia	10,265	600	40		80,512		218	2,566,186			2,900,581
Browns Bank	152,925	2,905	5,415	10	49,502		56,263	972,091		3,664	3,857,521
Western Nova Scotia	725	7,445	978	20	13,637		25	225			121,731
Nova Scotia, unclassified	3,720	270	277		7,230		1,090	84,150			175,182
Central Maine	8,360	2,350	150		139,280		1,000	76,890		58,925	419,045
Western Maine	6,110	125			297,065		1,095	259,230		176,633	860,348
Eastern Massachusetts	2,050,247	2,179	286	165	657,216		8,540	1,085,913		2,886,855	7,195,569
Inner Grounds	27,421	8,158			143,097		2,573	1,310,374		106,830	1,801,373
Western Side South Channel	265,405	37,466	5,122		596,930		52,040	23,016,097		436,644	27,762,470
Eastern Side South Channel	91,735	273	2,831	870	225,724		10,796	1,140,028		63,233	3,775,536
Northern Edge of Georges	152,462	1,985	6,162	15	259,256		7,932	188,815		24,794	3,659,334
Northeast Peak of Georges	147,123	2,050	4,622	1,970	89,722		13,729	8,850		8,026	3,389,001
Central Georges	111,119	340	7,092	100	707,106		3,627	48,900		4,568	5,667,737
Southeast Georges	19,735	40	2,004	60	63,866		903	138,550		13,591	1,296,933
Southwest Georges	8,820		100		40,775			45,000		400	718,877
Lightship Grounds	13,800		20		8,326			9,300		4,690	64,941
Nantucket Shoals	4,850		88		39,360		60	1,285		1,575	114,468
Southern New England, Offshore Grounds	130			25	1,370					3,725	5,720
Southern Massachusetts					19,900			2,500		500	24,175
Southern Gulf of Maine, unclassified	18,840	4,100	1,372		99,335	66	2,060	2,251,216		335	2,867,507
Total	3,179,427	79,511	49,547	[2] 3,415	3,704,996	[2] 66	183,763	33,276,952		3,796,138	69,498,084
Otter trawls, small:											
Southeast Sable Island Bank	1,885	40			10,285			103,949			136,084
Southern Nova Scotia	410	380			2,615			71,417			81,522
Eastern Maine	270		107		21,705		70				41,552
Central Maine	2,140	510	13,490		470,265		7,325	9,980		30,766	988,640
Western Maine	3,183	43	99		527,702		22,734	93,511		231,790	1,127,324
Eastern Massachusetts	472,555	3,560	56	15	1,761,437		53,305	680,560		12,082,117	16,088,961
Inner Grounds	1,835	220	110		177,730		20,500	273,785		172,138	755,493
Western Side South Channel	11,360	1,970	150		437,988		62,865	1,033,221		1,093,548	3,127,487
Eastern Side South Channel					920			400		120	2,390
Lightship Grounds					40,975					50	41,025
Nantucket Shoals	175			170	133,640					2,360	141,885
Southern Massachusetts					14,300						14,400
Total	493,813	6,723	14,012	[2] 185	3,599,562		166,799	2,266,823		13,612,889	22,546,763
Sink gill nets:											
Central Maine	26,616	5,280					40			1,790	52,266
Western Maine	2,851,525	10,624	290	356	14,143		867	7,356		163,883	5,076,083
Eastern Massachusetts	15,556,166	1,690	162	30	3,098		260	330	1,750	227,400	19,788,099
Inner Grounds	984,630	7									987,000
Nantucket Shoals	1,960										1,960
Total	19,420,897	17,601	452	[2] 386	17,241		1,167	7,686	[2] 1,750	393,073	25,905,408

[2] Incidental catch.

Landings by fishing vessels at the three principal New England ports, 1936—Continued

BY GEAR AND FISHING AREAS—Continued

Gear and fishing areas	Pollock	Cusk	Halibut	Mackerel	Flounders	Swordfish	Wolffish	Rosefish	Herring	Other	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Drift gill nets:											
Bay of Islands									370,656		370,656
Off Newfoundland									276,690		276,690
Gulf of St. Lawrence, unclassified (occasional)				25,380							25,380
Eastern Massachusetts	23,295			195,837						8,043	228,855
Western Side South Channel				120,940						315	121,255
Total	[2] 23,295			342,157					647,346	8,358	1,022,836
Purse seines:											
Northeast Sable Island Bank				24,500							24,500
Browns Bank				20,700							20,700
Central Maine	27,720			500,441						1,691	530,052
Western Maine		110		173,550	10				73,340	82,376	329,496
Eastern Massachusetts	3,900			10,574,682						270,987	10,849,619
Inner Grounds				320,135						7,000	327,135
Western Side South Channel	80			2,069,690					400	7,095	2,077,515
Eastern Side South Channel				730,535							730,535
Lightship Grounds	7,265			6,286,315						14,980	6,308,560
Nantucket Shoals				1,168,228						40,015	1,208,243
Southern New England, Offshore Grounds				4,948,362						7,124	4,955,486
Southern Massachusetts				209,230						700	209,930
Rhode Island				49,800							49,800
Southern Gulf of Maine, unclassified				33,100							33,100
South				1,131,745						40	1,131,785
Total	[2] 38,965	[2] 110		28,241,013	[1] 10				73,740	432,008	28,786,456
Grand total	34,407,430	7,278,588	2,213,527	28,772,079	15,522,445	1,242,710	2,045,616	66,591,559	834,886	18,947,586	416,384,118

[1] Exclusive of duplication.

[2] Incidental catch.

SUMMARY: BY FISHING AREAS

Fishing areas	Vessels fishing	Trips	Days absent	Cod			Haddock		Hake	
				Large	Market	Scrod	Large	Scrod	Large	Small
	Number	*Number*	*Number*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
East Coast of Newfoundland (area XVIII):										
East Coast of Newfoundland, unclassified	1	1	27	16,213	5,217					
Gulf of St. Lawrence, (area XIX):										
Bay of Islands	1	1	23							
Off Newfoundland	4	5	190	491,154	734,295	150,988	5,171		1,482	
Gulf of St. Lawrence, unclassified	5	12	339	974,199	114,384	25,904			8,000	
Newfoundland Banks (area XX):										
St. Pierre Bank (St. Peters)	2	3	65	13,342	10,270		6,160		9,357	
Newfoundland Banks, unclassified	1	2	42	54,415	8,070				600	
Total	[1] 9	24	686	1,549,323	872,236	176,892	11,331		19,439	
Off Nova Scotia (area XXI):										
Northeast Cape Breton	21	22	382	106,500	87,300		5,000		52,250	
Banquereau	53	151	1,677	1,541,065	7,200,766	816,457	3,048,397	2,554,426	80,841	
Canso	7	7	90	18,750	15,050		241,750	15,075	25,800	
Middle Ground	22	34	253	390,977	499,694	27,740	1,232,736	148,643	33,060	5,750
Northeast Sable Island Bank	39	79	703	682,721	850,723	102,590	3,032,714	672,850	42,441	
Southeast Sable Island Bank	16	20	175	236,081	390,109	2,599	347,935	57,105	53,430	1,090
Horseshoe Ground	61	248	2,155	3,220,167	2,369,512	103,310	12,536,790	1,365,580	581,247	1,020
Southwest Sable Island Bank	46	104	816	2,424,030	2,114,078	30,613	3,864,830	588,311	71,480	
Eastern Nova Scotia	7	9	77	60,280	73,000	5,240	297,960	60,080	29,895	
Emerald Bank	70	221	1,699	2,857,719	2,564,566	53,657	12,438,597	1,582,974	313,589	680
Central Nova Scotia	8	8	56	97,835	82,206	18,290	63,540	36,266	49,300	
La Have Bank (including Sambro Bank)	49	101	802	988,348	1,045,955	13,275	3,840,143	394,935	747,317	
Southern Nova Scotia	66	194	1,593	1,128,615	929,320	25,050	1,620,002	172,430	619,970	710
Browns Bank	125	495	4,692	3,626,746	3,395,694	168,854	10,092,208	2,175,920	1,220,263	
Western Nova Scotia	24	66	585	289,400	337,945	13,659	1,142,134	182,349	660,203	
Southern Bay of Fundy	4	4	28	7,995	7,380		42,320	3,990	27,860	650
Nova Scotia, unclassified	44	58	772	575,455	638,600	86,585	1,193,440	306,858	141,560	80
Total	[1] 160	1,821	16,555	18,252,684	22,601,898	1,467,910	55,040,496	10,317,792	4,750,506	9,980
Off New England (area XXII):										
Eastern Maine	4	5	25	3,015	560	15	14,355	535	58,335	200
Central Maine	74	348	1,691	247,708	195,896	1,957	468,648	58,733	2,185,923	124,825
Western Maine	104	1,754	2,378	1,464,864	178,820	4,495	309,920	10,578	671,794	147,471
Eastern Massachusetts	219	6,969	12,690	4,022,125	1,056,052	125,945	932,531	37,481	510,459	449,390
Inner Grounds	146	689	1,894	592,881	391,327	15,753	1,058,464	140,689	1,274,006	118,388
Northern Gulf of Maine, unclassified	2	2	30	73,000	10,275		26,200			
Western Side South Channel	209	1,153	5,644	1,135,776	1,209,278	60,828	4,712,417	848,534	449,599	56,120

[1] Exclusive of duplication.

[2] Incidental catch.

Landings by fishing vessels at the principal New England ports, 1936—Continued

SUMMARY: By fishing areas—Continued

Fishing areas	Vessels fishing	Trips	Days absent	Cod			Haddock		Hake	
				Large	Market	Scrod	Large	Scrod	Large	Small
Off New England (area XXII)—Continued.	*Number*	*Number*	*Number*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Eastern Side South Channel	97	224	1, 237	556, 311	574, 230	28, 073	4, 167, 095	1, 705, 447	330, 277	605
Northern Edge of Georges	78	365	2, 248	2, 053, 240	4, 223, 968	821, 450	8, 264, 250	5, 735, 975	239. 153	1, 168
Northeast Peak of Georges	90	489	3, 612	4, 719, 036	5, 754, 452	1, 605, 638	15, 957, 826	11, 272, 217	276, 331	932
Central Georges	70	275	1, 825	1, 346, 165	1, 271, 516	142, 927	6, 915, 241	4, 984, 620	71, 699	
Southeast Georges	77	146	907	1, 398, 085	668, 133	182, 982	2, 883, 440	2, 274, 762	71. 802	
Southwest Georges	48	68	467	391, 363	107, 930	2, 430	2, 183, 722	1, 269, 842	17, 979	
Lightship Grounds	67	203	832	4, 330	3, 300	2, 400	43, 420	10, 118	1, 520	
Nantucket Shoals	49	61	258	47, 080	86, 270	135	93, 715	23, 700	17, 390	7, 170
Southern New England, Offshore Grounds	59	157	656		335				135	
Southern Massachusetts	11	12	40	200	500		100		75	500
Rhode Island	1	1	3							
Southern Gulf of Maine, unclassified	80	142	1, 411	414, 048	391, 260	193, 295	1, 280, 533	829, 194	76, 260	1, 745
Total	[1] 384	13, 063	37, 848	18, 469, 227	16, 124, 102	3, 188, 323	49, 311, 877	29, 202, 425	6, 252, 737	908, 514
Off Middle Atlantic States (area XXIII):										
South	31	37	220							
Grand total	[1] 392	14, 945	55, 309	38, 271, 234	39, 598, 236	4, 833, 125	104, 363, 704	39, 520, 217	11, 022, 682	918, 494

Fishing areas	Pollock	Cusk	Halibut	Mackerel	Flounders	Swordfish	Wolffish	Rosefish	Herring	Other	Total
East Coast of Newfoundland (area XVIII):											
East Coast of Newfoundland, unclassified	*Pounds*	*Pounds*	*Pounds* 48, 667	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds* 981	*Pounds* 71, 078
Gulf of St. Lawrence (area XIX):											
Bay of Islands									370, 656		370, 656
Off Newfoundland									388, 740		1, 771, 830
Gulf of St. Lawrence, unclassified	175	6, 170	304, 944	133, 380						7, 409	1, 574, 565
Newfoundland Banks (area XX):											
St. Pierre Bank (St. Peters)		8, 550	60, 939								108, 618
Newfoundland Banks, unclassified			125, 250							1, 470	189, 805
Total	175	14, 720	539, 800	133, 380					759, 396	9, 860	4, 086, 552
Off Nova Scotia (area XXI):											
Northeast Cape Breton	200	200	80			137, 439					388, 969

Banquereau	229,229	21,235	583,404	----------	459,525	1,319	17,661	220,617	----------	2,053	16,776,995
Canso	3,050	16,200	3,941	----------	40,750	7,095	1,550	33,017	----------	83	422,111
Middle Ground	85,119	4,474	15,335	----------	151,133	----------	18,471	----------	----------	3,020	2,616,152
Northeast Sable Island Bank	287,750	17,678	30,375	25,126	256,598	35,212	10,571	16,050	----------	1,747	6,065,146
Southeast Sable Island Bank	68,746	39,833	34,557	----------	134,969	----------	30,293	116,003	----------	1,246	1,513,987
Horseshoe Ground	1,255,661	70,710	114,557	466	2,666,076	19,594	240,794	263,124	----------	12,100	24,820,708
Southwest Sable Island Bank	751,820	5,676	95,478	----------	226,815	----------	227,903	33,586	----------	1,481	10,436,101
Eastern Nova Scotia	34,230	21,860	5,706	----------	29,360	6,298	10,540	----------	----------	----------	634,449
Emerald Bank	1,166,283	58,581	113,955	----------	575,781	----------	312,137	75,850	----------	9,222	22,123,591
Central Nova Scotia	2,755	17,210	1,641	180	3,283	2,876	1,312	3,635	----------	----------	380,329
La Have Bank (including Sambro Bank)	207,683	660,546	66,832	----------	57,206	290	55,522	138,635	----------	1,019	8,217,706
Southern Nova Scotia	187,875	808,620	24,820	----------	475,615	----------	181,496	10,077,944	----------	192	16,252,659
Browns Bank	1,002,353	1,631,566	313,468	22,210	364,896	641,058	260,928	4,272,760	----------	19,625	29,208,549
Western Nova Scotia	59,178	354,243	19,296	20	13,895	----------	15,891	225	----------	26	3,088,464
Southern Bay of Fundy	4,635	8,820	741	----------	----------	----------	1,250	----------	----------	3,000	108,641
Nova Scotia, unclassified	177,240	98,346	15,223	----------	160,790	91,238	25,656	373,780	----------	37	3,884,888
Total	5,523,807	3,835,798	1,439,409	48,002	5,616,692	942,419	1,411,975	15,625,226	----------	54,851	146,939,445
Off New England (area XXII):											
Eastern Maine	270	2,660	107	----------	21,705	----------	70	----------	----------	----------	101,827
Central Maine	110,906	651,170	15,259	500,441	609,830	2,283	8,934	87,470	----------	117,989	5,387,972
Western Maine	2,874,934	125,855	2,244	173,906	839,335	1,073	25,331	360,572	73,340	669,980	7,934,512
Eastern Massachusetts	18,359,480	95,774	3,247	10,795,319	2,446,519	----------	140,670	1,869,723	1,750	15,516,847	56,363,312
Inner Grounds	1,145,663	1,924,419	14,126	320,135	326,915	----------	25,043	2,854,768	----------	323,360	10,525,937
Northern Gulf of Maine, unclassified	600	----------	142	----------	----------	5,053	----------	----------	----------	----------	115,270
Western Side South Channel	653,984	153,351	24,232	2,190,630	1,325,049	2,500	145,333	38,982,236	400	1,586,834	53,537,101
Eastern Side South Channel	282,772	155,104	13,736	731,455	538,500	5,877	22,471	3,045,508	----------	341,688	12,499,149
Northern Edge of Georges	1,438,591	76,926	36,930	16,749	949,359	2,689	63,557	419,383	----------	96,364	24,439,752
Northeast Peak of Georges	3,001,390	114,831	79,688	19,485	561,621	25,416	136,686	217,268	----------	61,774	43,804,591
Central Georges	415,747	18,804	25,319	3,498	1,506,600	2,688	32,761	62,650	----------	36,206	16,836,441
Southeast Georges	187,566	24,542	11,211	360	247,141	34,070	14,485	306,405	----------	18,407	8,323,391
Southwest Georges	98,915	15,480	1,938	----------	95,733	8,883	4,475	82,402	----------	26,872	4,307,964
Lightship Grounds	22,205	----------	111	6,286,315	51,631	8,193	20	9,300	----------	19,720	6,462,583
Nantucket Shoals	19,150	10,535	390	1,168,398	173,050	9,206	1,475	1,285	----------	43,950	1,702,899
Southern New England, Offshore Grounds	130	----------	----------	4,948,387	1,370	29,902	----------	----------	----------	10,849	4,991,108
Southern Massachusetts	----------	----------	----------	209,230	34,200	----------	----------	2,500	----------	1,200	248,505
Rhode Island	----------	----------	----------	49,800	----------	----------	----------	----------	----------	----------	49,800
Southern Gulf of Maine, unclassified	271,145	58,619	5,638	44,844	177,195	148,920	12,330	2,664,863	----------	10,795	6,580,684
Total	28,883,448	3,428,070	234,318	27,458,952	9,905,753	286,753	633,641	50,966,333	75,490	18,882,835	264,212,798
Off Middle Atlantic States (area XXIII): South	----------	----------	----------	1,131,745	----------	13,538	----------	----------	----------	40	1,145,323
Grand total	34,407,430	7,278,588	2,213,527	28,772,079	15,522,445	1,242,710	2,045,616	66,591,559	834,886	18,947,586	416,384,118

[1] Exclusive of duplication.

NOTE.—The weight of salted fish landed has been converted to the equivalent of fresh fish as landed. The roman numerals appearing in the stub of the above table refer to the numbers given these regions by the North American Council on Fishery Investigations.

Days' absence from port of fishing vessels landing fish at Boston and Gloucester, Mass., and Portland, Maine, 1936

Fishing areas	January	February	March	April	May	June	July	August	September	October	November	December	Total
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
East coast of Newfoundland (area XVIII):													
East coast of Newfoundland, unclassified					27								27
Gulf of St. Lawrence (area XIX):													
Bay of Islands	23												23
Off Newfoundland			59		34		97						190
Gulf of St. Lawrence, unclassified					85	123	21	41	38	31			339
Newfoundland Banks (area XX):													
St. Pierre Bank	22	26						17					65
Newfoundland Banks, unclassified					18	24							42
Total	45	26	59		164	147	118	58	38	31			686
Off Nova Scotia (area XXI):													
Northeast Cape Breton					16	15		197	154				382
Banquereau	111	21	70	86	93	363	252	119	71	114	79	298	1,677
Canso			18		18				50	4			90
Middle Ground	51	31		12	60	14	6		12		42	25	253
Northeast Sable Island Bank	68	13	1	22	58		73	170	36	58	162	42	703
Southeast Sable Island Bank	11	23	42	38	13		18				28	2	175
Horseshoe Ground	170	583	182	241	384	51		89	34	21	217	183	2,155
Southwest Sable Island Bank	137	62	182	233	28			7	8	17	54	88	816
Eastern Nova Scotia	13			11	22			5	15			11	77
Emerald Bank	222	210	480	475	50		2	17	14	18	90	121	1,699
Central Nova Scotia	6			1	6	15	8				16	4	56
La Have Bank (including Sambro Bank)	17	4	211	36	26		56	84	122	184		62	802
Southern Nova Scotia	104	27	22	35	143	31	7	95	119	199	516	295	1,593
Browns Bank	359	367	365	453	265	144	849	615	591	250	242	192	4,692
Western Nova Scotia	30	14	8		58	66	55	57	15	117	123	42	585
Southern Bay of Fundy									28				28
Nova Scotia, unclassified	65	24	9	42	59		9	182	151	29	62	140	772
Total	1,364	1,379	1,590	1,685	1,299	699	1,335	1,637	1,420	1,011	1,631	1,505	16,555
Off New England (area XXII):													
Eastern Maine					5	4	8	8					25
Central Maine	46	6	30	52	83	216	234	353	210	100	194	167	1,691
Western Maine	119	130	180	228	191	295	329	273	246	221	91	75	2,378
Eastern Massachusetts	713	426	684	796	824	1,395	1,576	1,001	1,194	1,527	1,533	1,021	12,690
Inner Grounds	170	192	202	186	193	23	64	333	42	121	104	264	1,894
Northern Gulf of Maine, unclassified			8			22							30
Western Side South Channel	102	156	247	335	665	515	679	561	681	793	404	506	5,644
Eastern Side South Channel	27		29	53	154	306	114	23	25	126	42	338	1,237
Northern Edge of Georges	248	80	65	68	71	220	387	372	250	252	181	54	2,248
Northeast Peak of Georges	67	133	279	377	100	130	392	427	781	653	218	55	3,612

Central Georges	105	131	134	132	428	248	116	103	20	44	140	224	1,825
Southeast Georges	60	207	113	24	68	65	84	63	56	----	46	121	907
Southwest Georges	258	17	72	3	38	25	16	4	----	----	----	34	467
Lightship Grounds	----	----	----	----	130	381	194	3	96	----	7	21	832
Nantucket Shoals	----	11	5	3	6	19	17	18	130	14	8	27	258
Southern New England, Offshore Grounds	----	----	----	----	222	157	3	271	----	----	3	----	656
Southern Massachusetts	14	----	----	----	----	----	1	25	----	----	----	----	40
Rhode Island	----	----	----	----	----	----	----	3	----	----	----	----	3
Southern Gulf of Maine, unclassified	185	93	31	----	16	223	299	66	299	64	40	95	1,411
Total	2,114	1,582	2,079	2,257	3,194	4,244	4,513	3,907	4,030	3,915	3,011	3,002	37,848
Off Middle Atlantic States (area XXIII): South	----	----	----	99	64	57	----	----	----	----	----	----	220
Grand total	3,523	2,987	3,728	4,044	4,721	5,147	5,966	5,602	5,488	4,957	4,642	4,507	55,309

NOTE.—The roman numerals appearing in the stub of the above table refer to the numbers given these areas by the North American Council on Fishery Investigations.

MACKEREL FISHERY OF THE ATLANTIC COAST [5]

In 1936, the mackerel fleet landed 40,221,600 pounds of mackerel, a decrease of 24 percent as compared with corresponding statistics of the preceding year.

An unusual feature of this year's activity was the fishery in the Block Island region, which extended from May 6 to November 25 and yielded more poundage than the Gulf of Maine.

Of the total landings, about 3,000,000 pounds were tinkers (fish under one pound) and 37,000,000 pounds were of larger sizes. The tinkers were caught between July 1 and October 31, with 91 percent of them being taken during August and September.

Mackerel fishery of the Atlantic coast, 1936

CATCH: BY AREAS IN 5-DAY PERIODS

Date	Southern (area XXIII)		Block Island (area XXII, west of Nantucket Shoals)		Gulf of Maine (area XXII, north of Nantucket Shoals)		Total
	Seiners	Netters	Seiners	Netters	Seiners	Netters	
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Apr. 11–15	740, 900	3, 100					744, 000
Apr. 16–20	756, 500	20, 200					776, 700
Apr. 21–25	2, 684, 900	13, 900					2, 698, 800
Apr. 26–30	1, 334, 500	16, 700					1, 351, 200
May 1–5	599, 400	3, 300					602, 700
May 6–10	12, 000	70, 800	132, 000				214, 800
May 11–15	3, 000	37, 700	1, 645, 900				1, 686, 600
May 16–20		6, 900	243, 400	3, 000			253, 300
May 21–25			1, 215, 900	7, 500			1, 223, 400
May 26–31			1, 539, 700	8, 500		600	1, 548, 800
June 1–5			586, 500	26, 000	600	58, 500	671, 600
June 6–10			1, 751, 500		4, 200	14, 100	1, 769, 800
June 11–15			1, 722, 200		263, 800	1, 000	1, 987, 000
June 16–20			1, 023, 800		682, 300		1, 706, 100
June 21–25			184, 200		1, 254, 600		1, 438, 800
June 26–30			6, 400		855, 300	1, 000	862, 700
July 1–5			65, 000		2, 388, 700		2, 453, 700
July 6–10			61, 000		1, 729, 400		1, 790, 400
July 11–15			98, 800		1, 004, 800		1, 103, 600
July 16–20			184, 500		426, 500		611, 000
July 21–25			796, 200		123, 300		919, 500
July 26–31			844, 100		151, 500		995, 600
Aug. 1–5			550, 600		111, 700		662, 300
Aug. 6–10			483, 700		220, 800		704, 500
Aug. 11–15			1, 481, 700		115, 800		1, 597, 500
Aug. 16–20			1, 300, 600		62, 900		1, 363, 500
Aug. 21–25			155, 100		543, 000		698, 100
Aug. 26–31			73, 200		857, 100		930, 300
Sept. 1–5					321, 400		321, 400
Sept. 6–10			221, 000		324, 400		545, 400
Sept. 11–15			1, 040, 400		131, 000	700	1, 172, 100
Sept. 16–20			1, 041, 500		70, 400		1, 111, 900
Sept. 21–25			242, 400		7, 500		249, 900
Sept. 26–30			35, 100		3, 700	1, 700	40, 500
Oct. 1–5					7, 000	700	7, 700
Oct. 6–10			1, 800		354, 800	300	356, 900
Oct. 11–15			27, 000		678, 400	1, 800	707, 200
Oct. 16–20			52, 200		140, 400	1, 900	194, 500
Oct. 21–25					132, 700	8, 000	140, 700
Oct. 26–31					100	14, 900	15, 000
Nov. 1–5					47, 200	6, 400	53, 600
Nov. 6–10			40, 200		418, 400	900	459, 500
Nov. 11–15					680, 900	300	681, 200
Nov. 16–20					43, 500		43, 500
Nov. 21–25			27, 300		19, 200	2, 700	49, 200
Nov. 26–30						71, 300	71, 300
Dec. 1–5					64, 000	63, 800	127, 800
Dec. 6–10					274, 600	80, 700	355, 300
Dec. 11–15					89, 300	21, 900	111, 200
Dec. 16–20						33, 500	33, 500
Dec. 21–25						6, 000	6, 000
Total	6, 131, 200	172, 600	18, 874, 900	45, 000	14, 605, 200	392, 700	40, 221, 600

NOTE.—The roman numerals appearing in the box heads of the above table refer to the numbers given these areas by the North American Council on Fishery Investigations.

[5] This section, prepared by J. R. Webster under the direction of O. E. Sette of the Division of Scientific Inquiry, includes landings at Portsmouth, Va.; Cape May and Wildwood, N. J.; New York, N. Y.; Newport, R. I.; New Bedford, Buzzards Bay, Provincetown, Boston, and Gloucester, Mass.; and Portland, Maine, by purse-seine vessels "seiners," drift-gill-net vessels "netters," and such boats as fish by the same methods and on the same grounds as the vessels. It does not include the catch of the smaller boats or the catch by other forms of gear.

Mackerel fishery of the Atlantic coast, 1936—Continued

OPERATING UNITS AND CATCH: BY FLEET CLASSIFICATION AND GROUNDS

Designation	Vessels and boats	Tonnage	Crew	Trips	Total catch
SOUTHERN—AREA XXIII					
Seiners:	*Number*	*Net tons*	*Number*	*Number*	*Pounds*
Regular vessels	43	1,730	552	201	6,079,300
Miscellaneous vessels	2	98	28	3	51,900
Netters:					
Regular vessels	6	115	38	34	167,500
Miscellaneous vessels	1	37	8	1	2,500
Miscellaneous boats	1			2	2,600
Total	[1] 52	1,980	626	241	6,303,800
BLOCK ISLAND—AREA XXII (West of Nantucket Shoals only)					
Seiners:					
Spring:					
Regular vessels	47	1,897	600	312	9,672,900
Miscellaneous vessels	6	167	71	16	378,600
Summer:					
Regular vessels	38	1,531	481	256	5,694,600
Miscellaneous vessels	14	509	168	27	393,900
Miscellaneous boats	1			1	6,000
Fall:					
Regular vessels	29	1,147	376	101	2,335,000
Miscellaneous vessels	14	579	176	20	392,400
Miscellaneous boats	1			1	1,500
Netters:					
Spring:					
Regular vessels	4	81	28	7	42,500
Miscellaneous boats	1			1	2,500
Total	[1] 62	5,911	1,900	742	18,919,900
GULF OF MAINE—AREA XXII (North of Nantucket Shoals only)					
Seiners:					
Regular vessels	46	1,849	586	656	12,441,100
Miscellaneous vessels	28	500	237	251	1,768,500
Miscellaneous boats	13			85	395,600
Netters:					
Spring:					
Miscellaneous vessels	6	61	32	14	42,300
Miscellaneous boats	5			13	32,900
Fall:					
Regular vessels	13	247	94	133	281,100
Miscellaneous vessels	10	131	55	59	31,600
Miscellaneous boats	6			15	4,800
Total	[1] 91	2,788	1,004	1,226	14,997,900
Total seiners	[1] 76			1,930	39,611,300
Total netters	[1] 33			279	610,300
Grand total	[1] 101			2,209	40,221,600

[1] Exclusive of duplication and of boats.

NOTE.—The roman numerals appearing in the stub of the above table refer to the numbers given these areas by the North American Council on Fishery Investigations.

FISHERIES OF THE MIDDLE ATLANTIC STATES

(Area XXIII) [6]

The most recent complete fishery statistics for the Middle Atlantic States (New York, New Jersey, Pennsylvania, and Delaware) are those collected for the year 1935. In that year the yield of the commercial fisheries amounted to 279,438,100 pounds, valued at $6,415,664 to the fishermen, representing an increase of 65 percent in volume and 33 percent in value as compared with the catch in 1933, the most recent previous year for which catch statistics are available. Detailed statistics of these fisheries for 1935 appear in "Fishery Industries of the United States, 1936," appendix I to the Report of the United States Commissioner of Fisheries, 1937. A summary of these fisheries and statistics on the catch and operating units of the fisheries of Delaware for 1936 as well as the 1936 shad fishery of the Hudson River appear in the following tables. Data on the fisheries of Delaware for 1936 were made possible through the cooperation of the State of Delaware in furnishing personnel to aid in a survey of that State.

Fisheries of the Middle Atlantic States, 1935

OPERATING UNITS: BY STATES

Item	New York	New Jersey	Pennsylvania	Delaware	Total
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	930	1,039		530	2,499
On boats and shore:					
Regular	1,219	1,391		32	2,642
Casual	2,213	1,870	41	355	4,479
Total	4,362	4,300	41	917	9,620
Vessels:					
Steam	4	3		12	19
Net tonnage	485	150		1,455	2,090
Motor	170	185		13	368
Net tonnage	2,579	3,026		229	5,834
Sail	2	2			4
Net tonnage	12	17			29
Total vessels	176	190		25	391
Total net tonnage	3,076	3,193		1,684	7,953
Boats:					
Motor	750	1,036		44	1,830
Other	1,498	1,605	10	138	3,251
Accessory boats	85	56		36	177
Apparatus:					
Purse seines:					
Mackerel	2				2
Length, yards	1,000				1,000
Menhaden	11	5		12	28
Length, yards	3,840	1,816		6,699	12,355
Other	3	5			8
Length, yards	910	1,820			2,730
Haul seines	81	108	10	61	260
Length, yards	11,901	9,203	1,955	17,955	41,014
Gill nets:					
Anchor	101	3			104
Square yards	39,670	2,500			42,170

[6] This is the number given to this area by the North American Council on Fishery Investigations. It should be explained that there are included in this area craft whose principal fishing ports are in the area but at times fish elsewhere. A notable example is the southern trawl fishery which extends into area XXIV. For a clearer understanding of the statistics published in this section, the reader is referred to the section in the latter part of this document entitled "Statistical survey procedure."

Fisheries of the Middle Atlantic States, 1935—Continued

OPERATING UNITS: By States—Continued

Item	New York	New Jersey	Pennsylvania	Delaware	Total
Apparatus—Continued.					
Gill nets—Continued.	*Number*	*Number*	*Number*	*Number*	*Number*
Drift	151	891		40	1,082
Square yards	354,750	480,662		117,875	953,287
Runaround	35	60		13	108
Square yards	79,179	181,550		3,980	264,709
Stake	135	160		30	325
Square yards	36,920	38,038		13,020	87,978
Lines:					
Hand	159	600		28	787
Hooks and baits	159	894		44	1,097
Trawl	2,646	373			3,019
Hooks	185,900	233,400			419,300
Troll		451			451
Hooks		451			451
Trot with baits or snoods	58	16			74
Baits or snoods	37,400	13,215			50,615
Trot with hooks	14				14
Hooks	2,550				2,550
Pound nets	295	156		22	473
Weirs		104			104
Stop nets	1	56		11	68
Square yards	121	54,600		1,330	56,051
Fyke nets	526	872		257	1,655
Dip nets	140	45		64	249
Cast nets		3		1	4
Scap nets	198				198
Drag nets	1	22			23
Yards at mouth	2	44			46
Drop nets		15			15
Otter trawls:					
Fish	106	66		1	173
Yards at mouth	2,447	1,526		23	3,996
Shrimp	1	1			2
Yards at mouth	23	32			55
Wire baskets		25			25
Pots:					
Crab		10			10
Eel	3,287	1,717		345	5,349
Fish	300	8,191			8,491
Lobster	5,179	12,155		115	17,449
Harpoons	25				25
Spears	146	42			188
Dredges:					
Clam	12	38		18	68
Yards at mouth	10	40		19	69
Crab	2	47		12	61
Yards at mouth	4	51		14	69
Mussel	9				9
Yards at mouth	9				9
Oyster	112	220		14	346
Yards at mouth	167	265		17	449
Scallop	473	17			490
Yards at mouth	540	57			597
Tongs:					
Oyster	361	100			461
Other	1,198	842		2	2,042
Rakes:					
Oyster		23			23
Other	376	1,286			1,662
Forks	534	14			548
Hoes		201			201
Gaffs		1			1

Fisheries of the Middle Atlantic States, 1935—Continued

CATCH: BY STATES [1]

Species	New York		New Jersey		Pennsylvania		Delaware		Total	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	358,600	$4,383	41,300	$233			154,900	$2,050	554,800	$6,666
Bluefish	1,002,700	74,296	1,959,900	117,649			13,800	1,113	2,976,400	193,058
Bonito	207,300	6,155	93,600	3,254			100	2	301,000	9,411
Butterfish	2,817,800	120,150	3,619,200	146,132			600	24	6,437,600	266,306
Carp	185,100	14,006	233,700	16,385	5,100	$408	70,200	5,095	494,100	35,894
Catfish and bullheads	26,900	3,401	45,300	2,710			48,400	1,735	120,600	7,846
Cod	1,037,500	54,756	818,500	29,387					1,856,000	84,143
Crevalle			900	9					900	9
Croaker	84,200	1,336	7,367,000	118,730			590,800	7,538	8,042,000	127,604
Cunners			3,400	34					3,400	34
Drum:										
Black			9,300	101					9,300	101
Red or redfish			39,100	895			100	2	39,200	897
Eels:										
Common	313,200	41,685	250,500	20,914			54,900	6,081	618,600	68,680
Conger	4,000	99	16,400	405			300	4	20,700	508
Flounders	5,978,800	309,731	3,248,500	203,155			24,200	1,104	9,251,500	513,990
Frigate mackerel	49,200	862	108,500	1,272					157,700	2,134
Gizzard shad							1,600	45	1,600	45
Goosefish	58,100	1,126	13,100	65					71,200	1,191
Grayfish	68,900	1,002	44,600	891			2,000	160	115,500	2,053
Groupers			2,500	99					2,500	99
Haddock	1,323,000	60,749							1,323,000	60,749
Hake	170,400	4,389	33,700	637			5,000	28	209,100	5,054
Herring, sea	75,200	1,457	258,600	1,745					333,800	3,202
Hickory shad	1,000	24	2,500	25					3,500	49
Kingfish or "king mackerel"			13,000	533					13,000	533
King whiting or "kingfish"	23,800	2,338	46,200	2,451			700	23	70,700	4,812
Launce			1,900	254					1,900	254
Mackerel	1,510,900	40,868	1,570,800	50,376					3,081,700	91,244
Menhaden	46,390,700	89,387	49,757,700	92,623			83,454,600	292,091	179,603,000	474,101
Mullet			21,000	1,634			78,500	2,276	99,500	3,910
Mummichog	4,200	370	9,000	746					13,200	1,116
Pigfish			100	2					100	2
Pike or pickerel	100	6							100	6
Pollock	17,300	569	4,300	106					21,600	675
Pompano			4,100	1,230					4,100	1,230
Scup or porgy	1,898,300	47,288	5,185,000	87,293			12,200	205	7,095,500	134,786
Sea bass	411,700	29,243	1,655,500	76,313			21,900	548	2,089,100	106,104
Sea robin	46,500	1,298	45,100	460					91,600	1,758
Shad	476,000	39,563	818,000	83,687	10,200	3,996	24,700	4,544	1,328,900	131,790
Sharks	2,300	59	42,400	738					44,700	797

Silversides	68,400	2,675	1,200	600					69,600	3,275
Skates	47,700	836	84,200	646					131,900	1,482
Snapper, red			15,300	1,144					15,300	1,144
Spanish mackerel			23,600	1,723					23,600	1,723
Spot			17,700	538			1,500	75	19,200	613
Squeteagues or "sea trout":										
Gray	1,639,700	80,749	8,072,200	228,713			428,100	11,299	10,140,000	320,761
Spotted			2,700	120					2,700	120
Squirrel hake			25,100	253					25,100	253
Striped bass	37,100	4,781	7,700	1,247			16,700	2,207	61,500	8,235
Sturgeon	7,800	1,550	11,500	1,690			500	187	19,800	3,427
Suckers	18,800	1,325	54,000	3,324	15,700	1,256	600	18	89,100	5,923
Sunfish	1,000	59							1,000	59
Swellfish	5,000	250							5,000	250
Swordfish	42,600	8,850							42,600	8,850
Tautog	17,700	770	24,400	647			1,000	20	43,100	1,437
Thimble-eyed mackerel	600	6	244,600	3,526					245,200	3,532
Tilefish	2,494,200	94,100	100	6					2,494,300	94,106
Tomcod	7,300	131							7,300	131
Tuna or "horse mackerel"	6,100	350	18,000	793					24,100	1,143
Whitebait	9,100	1,035							9,100	1,035
White perch	55,900	2,798	35,200	3,038			22,000	1,203	113,100	7,039
Whiting	2,284,000	61,794	3,340,100	33,937			5,000	32	5,629,100	95,763
Yellow perch	7,900	466	1,500	180			3,800	284	13,200	930
Total	71,294,600	1,213,121	89,363,300	1,345,298	31,000	5,660	85,038,700	339,993	245,727,600	2,904,072
SHELLFISH, ETC.										
Crabs:										
Hard	464,300	13,767	481,000	20,617			351,900	5,886	1,297,200	40,270
King			2,633,300	8,521			502,000	753	3,135,300	9,274
Soft and peelers	125,200	25,720	205,500	67,686			59,300	13,237	390,000	106,643
Lobsters	420,500	87,167	218,800	50,754			4,100	1,025	643,400	138,946
Shrimp	84,700	3,827	109,300	9,367					194,000	13,194
Clams:										
Hard, public [2]	1,524,700	258,665	3,326,600	479,122			38,900	4,910	4,890,200	742,697
Hard, private [2]	120,000	22,155	136,900	21,162			69,500	8,110	326,400	51,427
Soft, public [3]	770,600	71,691	1,055,900	69,878					1,826,500	141,569
Soft, private [3]	8,000	1,000							8,000	1,000
Surf or skimmer	523,300	22,825	313,900	13,829					837,200	36,654
Conchs	8,600	955							8,600	955
Mussels, sea	82,500	4,629	2,900	90			13,000	1,000	98,400	5,719

[1] Excluding the seed oyster fishery. The seed oyster fishery in New York, New Jersey, and Delaware was prosecuted by 1,379 fishermen who used 114 vessels, 73 motorboats, 145 other boats, 230 dredges, 202 tongs, and 25 rakes; and took 937,970 bushels of seed oysters, valued at $309,456 from public beds, while 41,874 bushels, valued at $28,540, were taken from private beds. Of the total number of persons fishing for seed oysters, 1,260 are duplicated among those fishing for market oysters or other species. Similarly, the following craft and gear are duplicated: 81 vessels, 33 motorboats, 19 other boats, 164 dredges, 34 tongs, and 8 rakes.

[2] Statistics on hard clams are based on yields of 8 pounds of meats to the bushel in New York, 9.76 pounds in New Jersey, and 10 pounds in Delaware.

[3] Statistics on soft clams are based on yields of 16 pounds of meats to the bushel in New York, and 20 pounds in New Jersey.

Fisheries of the Middle Atlantic States, 1935—Continued

CATCH: BY STATES—Continued

Species	New York		New Jersey		Pennsylvania		Delaware		Total	
SHELLFISH, ETC.—continued										
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Oysters, market: [1]										
Public, spring	119,700	$17,165	10,400	$1,860					130,100	$19,025
Public, fall	209,200	30,387	6,400	1,110					215,600	31,497
Private, spring	2,039,500	342,130	4,110,400	340,015					6,149,900	682,145
Private, fall	3,398,700	579,605	4,335,000	360,744			581,400	$54,989	8,315,100	995,338
Scallops:										
Bay	106,700	35,593							106,700	35,593
Sea	2,213,500	318,768	426,600	25,316					2,640,100	344,084
Squid	1,371,200	39,265	1,050,400	28,081			1,400	21	2,423,000	67,367
Turtles:										
Green			3,900	47					3,900	47
Hawksbill			200	2					200	2
Loggerhead			3,900	69					3,900	69
Snapper			7,200	374			5,400	443	12,600	817
Bloodworms	24,300	20,125	100	94					24,400	20,219
Sandworms	29,500	26,800	300	241					29,800	27,041
Total	13,644,700	1,922,239	18,438,900	1,498,979			1,626,900	90,374	33,710,500	3,511,592
Grand total	84,939,300	3,135,360	107,802,200	2,844,277	31,000	$5,660	86,665,600	430,367	279,438,100	6,415,664

[1] Statistics on oysters are based on yields of 7 pounds of meats to the bushel in New York, 8.91 pounds in New Jersey, and 7 pounds in Delaware.

NOTE.—The above includes the catch made by Middle Atlantic craft in the southern trawl fishery as well as in other fisheries in the South Atlantic.

DELAWARE

Fisheries of Delaware, 1936

OPERATING UNITS: BY GEAR

Item	Purse seines, menhaden	Haul seines	Gill nets			Lines	
			Drift	Run-around	Stake	Hand	Trot, with baits or snoods
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	500						
On boats and shore:							
Regular		6	5	2		2	
Casual		143	47	20	7	2	24
Total	500	149	52	22	7	4	24
Vessels:							
Steam	12						
Net tonnage	1,530						
Motor	1						
Net tonnage	68						
Total vessels	13						
Total net tonnage	1,598						
Boats:							
Motor			17	2	1	2	12
Other		44	6	8	3		12
Accessory boats	39						
Apparatus:							
Number	13	40	32	10	50	24	24
Length, yards	4,610	9,990					
Square yards			84,990	1,600	5,900		
Hooks, baits, or snoods						48	9,600

Item	Pound nets	Stop nets	Fyke nets	Dip nets	Cast nets	Pots	
						Eel	Lobster
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On boats and shore:							
Regular			6	17		4	
Casual	7	6	26	31	2	17	6
Total	7	6	32	48	2	21	6
Boats:							
Motor	2		6	7			4
Other	2	3	10	38	1	10	4
Apparatus:							
Number	16	9	215	48	2	444	105
Square yards		1,220					

Item	Dredges		By hand, other than for oysters	Total, exclusive of duplication
	Clam	Oyster		
Fishermen:	*Number*	*Number*	*Number*	*Number*
On vessels	17	12		524
On boats and shore:				
Regular				34
Casual			42	253
Total	17	12	42	811
Vessels:				
Steam				12
Net tonnage				1,530
Motor	5	2		7
Net tonnage	79	34		157
Total vessels	5	2		19
Total net tonnage	79	34		1,687
Boats:				
Motor				44
Other			42	145
Accessory boats				39
Apparatus:				
Number	10	4		1,099
Yards at mouth	12	5		

Fisheries of Delaware, 1936—Continued

CATCH: BY GEAR—Continued

Species	Purse seines		Haul seines		Gill nets					
					Drift		Runaround		Stake	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives			127,800	$1,278	2,000	$50				
Bluefish					3,900	474				
Carp			23,200	1,838						
Catfish and bullheads			3,500	210						
Croaker			104,600	978	83,200	1,223				
Menhaden	32,622,600	$163,116								
Mullet			1,200	24			44,500	$890		
Shad					7,500	1,116			200	$45
Spot					16,000	800				
Squeteagues or "sea trout," gray			230,000	4,520	52,400	2,770				
Striped bass			5,800	788			1,000	170	4,000	300
White perch			11,600	764	1,700	134	500	60		
Turtles, snapper			200	16						
Total	32,622,600	163,116	507,900	10,416	166,700	6,567	46,000	1,120	4,200	345

Species	Lines				Pound nets		Stop nets		Fyke nets	
	Hand		Trot with baits or snoods							
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives									14,700	$147
Bluefish	5,000	$600								
Carp					1,000	$93	3,400	$315	2,000	120
Catfish and bullheads					1,700	51			11,400	386
Eels, common									13,700	1,629
Flounders									1,800	90
Sea bass	15,000	600								
Squeteagues or "sea trout," gray	3,000	150							200	18
Striped bass									16,100	1,598
Tautog	1,000	20								
White perch					2,200	110			8,200	440
Yellow perch					600	48				
Crabs, hard			150,000	$2,400					5,600	229
Turtles, snapper							200	20	1,300	78
Total	24,000	1,370	150,000	2,400	5,500	302	3,600	335	75,000	4,735

Species	Dip nets		Cast nets		Pots			
					Eel		Lobster	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Carp			1,000	$70				
Eels, common					57,500	$6,937		
Crabs, soft and peelers	42,600	$9,712						
Lobsters							3,600	$825
Total	42,600	9,712	1,000	70	57,500	6,937	3,600	825

Fisheries of Delaware, 1936—Continued

CATCH: BY GEAR—Continued

Species	Dredges				By hand		Total	
	Clam		Oyster					
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives							144,500	$1,475
Bluefish							8,900	1,074
Carp							30,600	2,436
Catfish and bullheads							16,600	647
Croaker							187,800	2,201
Eels, common							71,200	8,566
Flounders							1,800	90
Menhaden							32,622,600	163,116
Mullet							45,700	914
Sea bass							15,000	600
Shad							7,700	1,161
Spot							16,000	800
Squeteagues or "sea trout," gray							285,600	7,458
Striped bass							26,900	2,856
Tautog							1,000	20
White perch							24,200	1,508
Yellow perch							600	48
Crabs:								
Hard							155,600	2,629
King					378,400	$578	378,400	578
Soft and peelers							42,600	9,712
Lobsters							3,600	825
Clams:								
Hard, public	2,900	$575					2,900	575
Hard, private	42,800	5,725	1,200	$300			44,000	6,025
Oysters, market, private, fall			5,500	800			5,500	800
Turtles, snapper							1,700	114
Total	45,700	6,300	6,700	1,100	378,400	578	34,141,000	216,228

OPERATING UNITS: BY COUNTIES

Item	Kent	New Castle	Sussex
Fishermen:	*Number*	*Number*	*Number*
On vessels	24		500
On boats and shore:			
Regular		1	33
Casual	54	34	165
Total	78	35	698
Vessels:			
Steam			12
Net tonnage			1,530
Motor	6		1
Net tonnage	89		68
Total vessels	6		13
Total net tonnage	89		1,598
Boats:			
Motor	2	8	34
Other	50	11	84
Accessory boats			39
Apparatus:			
Purse seines, menhaden			13
Length, yards			4,610
Haul seines	9	8	23
Length, yards	2,350	985	6,655
Gill nets:			
Drift	4	10	18
Square yards	5,600	59,175	20,215

Fisheries of Delaware—Continued

OPERATING UNITS: By counties—Continued

Item	Kent	New Castle	Sussex
Apparatus—Continued.			
Gill nets—Continued	*Number*	*Number*	*Number*
Runaround			10
Square yards			1,600
Stake	20		30
Square yards	3,500		2,400
Lines:			
Hand			24
Hooks			48
Trot with baits or snoods			24
Baits or snoods			9,600
Pound nets		3	13
Stop nets	5	4	
Square yards	740	480	
Fyke nets	47	100	68
Dip nets			48
Cast nets	2		
Pots:			
Eel	24	50	370
Lobster			105
Dredges:			
Clam	10		
Yards at mouth	12		
Oyster	4		
Yards at mouth	5		

CATCH: By counties

Species	Kent		New Castle		Sussex	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives					144,500	$1,475
Bluefish					8,900	1,074
Carp	5,800	$415	24,700	$2,014	100	7
Catfish and bullheads			16,600	647		
Croaker	60,600	538			127,200	1,663
Eels, common	600	90	9,300	1,021	61,300	7,455
Flounders					1,800	90
Menhaden					32,622,600	163,116
Mullet					45,700	914
Sea bass					15,000	600
Shad	300	75	4,100	608	3,300	478
Spot					16,000	800
Squeteagues or "sea trout," gray	145,400	3,052			140,200	4,406
Striped bass	300	18			26,600	2,838
Tautog					1,000	20
White perch	3,700	254			20,500	1,254
Yellow perch					600	48
Crabs:						
Hard			5,600	229	150,000	2,400
King	378,400	578				
Soft and peelers					42,600	9,712
Lobsters					3,600	825
Clams:						
Hard, public	2,900	575				
Hard, private	44,000	6,025				
Oysters, market, private, fall	5,500	800				
Turtles, snapper	400	36	1,300	78		
Total	647,900	12,456	61,600	4,597	33,431,500	199,175

Industries related to the fisheries of the Middle Atlantic States

OPERATING UNITS, SALARIES, AND WAGES, 1935

Item	New York	New Jersey	Pennsylvania	Delaware	Total
Transporting:					
Persons engaged:	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	60	9			69
On boats	2	70			72
Total	62	79			141
Vessels, motor	19	4			23
Net tonnage	307	71			378
Boats	2	61			63
Wholesale and manufacturing:					
Establishments	221	123	47	17	408
Persons engaged:					
Proprietors	131	113	44	14	302
Salaried employees	787	146	110	28	1,071
Wage earners:					
Average for season	2,487	1,422	371	490	4,770
Average for year	2,097	892	319	177	3,485
Paid to salaried employees	$2,057,758	$305,516	$217,826	$23,946	$2,605,046
Paid to wage earners	$2,869,058	$786,618	$314,788	$90,997	$4,061,461
Total, salaries and wages	$4,926,816	$1,092,134	$532,614	$114,943	$6,666,507
Fishermen manufacturing	485	73			558

PRODUCTS MANUFACTURED

Item	New York		New Jersey		Pennsylvania		Delaware	
By manufacturing establishments:								
Buffalofish, smoked pounds	*Quantity* 854,600	*Value* $215,950	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Butterfish, smoked do	581,900	150,129	73,176	$22,363	(1)	(1)		
Carp, smoked do			54,678	21,097				
Cisco, chubs and tullibees, smoked pounds	3,405,700	1,013,710	198,247	75,389	(1)	(1)		
Cod, fresh fillets [2] do	3,122,000	394,450	(1)	(1)				
Flounders, fresh fillets [2] pounds	1,341,568	213,809	(1)	(1)				
Haddock, fresh fillets [2] pounds	1,947,000	247,250	(1)	(1)				
Hake, fresh fillets [2] do	109,500	12,550						
Herring, sea, kippered pounds	146,600	19,140			(1)	(1)		
Lake trout, smoked do	205,400	64,601	(1)	(1)	(1)	(1)		
Mackerel, smoked do	446,900	66,427	10,644	2,301	(1)	(1)		
Pollock, fresh fillets [2] do	44,125	5,912						
Paddlefish or spoonbill cat, smoked pounds	312,000	128,945						
Salmon:								
Smoked do	6,319,600	1,863,699	382,909	130,273	(1)	(1)		
Kippered do	349,250	104,900	55,885	22,015	(1)	(1)		
Caviar, canned [3] standard cases	2,149	44,997						
Shad, smoked pounds	78,200	16,038	(1)	(1)	(1)	(1)		
Sturgeon:								
Smoked do	1,252,900	846,700	191,194	134,480	(1)	(1)		
Caviar, canned [2] standard cases	3,112	426,254						
Whitefish:								
Smoked pounds	1,505,100	450,246	166,927	54,267	(1)	(1)		
Caviar, canned [2] standard cases	1,020	21,195						
Crab, king, dry scrap [2] tons			293	12,858			(1)	(1)
Clams, soft, fresh-shucked gallons			16,400	16,190				
Marine-shell products:								
Buttons [2] gross	405,978	309,171	1,542,264	1,104,134	(1)	(1)		
Novelties [2]		87,250		125,082				

See footnotes at end of table.

Industries related to the fisheries of the Middle Atlantic States—Continued

PRODUCTS MANUFACTURED—Continued

Item	New York		New Jersey		Pennsylvania		Delaware	
By manufacturing establishments—Continued.								
Oysters, fresh shucked gallons	*Quantity* 473, 588	*Value* $744, 472	*Quantity* 424, 796	*Value* $729, 309	*Quantity* 72, 825	*Value* $144, 214	*Quantity* 20, 600	*Value* $26, 100
Oyster-shell products:								
Poultry feed [2] tons			6, 428	47, 317	4, 532	39, 678	(1)	(1)
Lime [2] do			2, 102	9, 003	1, 220	5, 086	(1)	(1)
Whale products:								
Sperm oil [2] gallons	1, 848	370						
Whale oil [2] do	3, 139, 968	1, 360, 662						
Unclassified products:								
Smoked pounds	(3)	(3)	(3)	(3)	[4] 1, 425, 000	[4] 368, 663		
Canned [2] standard cases	[5] 17, 100	[5] 167, 082	(3)	(3)				
Miscellaneous [6]		[7] 594, 769		[8] 1, 584, 722		[9] 214 221		[10] 232, 483
Total		9, 570, 678		4, 090, 800		771, 862		258, 583
By fishermen:								
Eels, smoked pounds	17, 600	5, 640	2, 700	820				
Herring, sea, smoked pounds			4, 000	160				
Mackerel, smoked do			400	40				
Whiting, smoked do			350	35				
Scallops:								
Bay, fresh shucked gallons	14, 506	43, 433						
Sea, fresh shucked gallons	229, 203	271, 328	46, 799	51, 349				
Crab meat, packaged, fresh cooked pounds			417	313				
King crab scrap tons			232	5, 623				
Total		320, 401		58, 340				
Grand total		9, 891, 079		4, 149, 140		771, 862		258, 583

[1] The production of this item is included under "Unclassified products."
[2] Data are for 1936.
[3] This item has been included under "Miscellaneous."
[4] Includes smoked butterfish, chubs, haddock fillets, finnan haddie, sea herring (bloaters and kippers) lake trout, mackerel, salmon, shad, sturgeon, and whitefish; and kippered salmon and shad.
[5] Includes canned pickled eels, fish paste, hard-clam products, pickled sea mussels, and terrapin, and turtle products.
[6] Both 1935 and 1936 data are included in these items.
[7] Includes fresh fillets of bluefish and halibut; smoked eels; halibut- and tuna-liver oil; menhaden products; miscellaneous fish meal; and mussel-shell buttons.
[8] Includes fresh fillets of cod, flounders and haddock; smoked bluefish, cod, cod fillets and steaks, eels, flounders, goosefish, haddock, lake trout, shad, and sea herring (bloaters); fresh-shucked soft clams; salted boneless cod; canned hard-clam products and oysters; swordfish, tuna and totuava liver oil; and menhaden products.
[9] Includes fresh-shucked hard clams, marine-shell buttons; and miscellaneous fish scrap.
[10] Includes oyster-shell products, king crab scrap, and menhaden products.

NOTE.—Unless otherwise indicated, data are for 1935. The total value of the manufactured products for the Middle Atlantic States was as follows: By manufacturing establishments, $14,691,923; and by fishermen $378,741. Some of the above products may have been manufactured from fishery products imported from another State or a foreign country; therefore, they cannot be correlated directly with the catch within the State. Of the total number of persons engaged on transporting craft, 125 have been included as fishermen, and among the total number of persons engaged in the preparation of fishermen's prepared products, 552 have been included as fishermen. The whale products shown above were manufactured on a floating factory ship operating in the Southern Hemisphere.

VESSEL FISHERIES AT NEW YORK CITY

During 1936 fishing vessels of 5 net tons capacity or greater landed 37,807,000 pounds of fishery products at New York City. The landings consisted of bluefish, 1,228,000 pounds; butterfish, 966,000 pounds; cod, 6,736,000 pounds; croaker, 5,000 pounds; conger eels,

5,000 pounds; flounders, 10,892,000 pounds; haddock, 9,758,000 pounds; hake, 73,000 pounds; halibut, 9,000 pounds; mackerel, 3,434,000 pounds; pollock, 65,000 pounds; sea bass, 594,000 pounds; scup or porgy, 1,066,000 pounds; swordfish, 1,000 pounds; tilefish, 2,563,000 pounds; whiting 288,000 pounds; wolffish, 3,000 pounds; sea scallops, 110,000 pounds; and squid, 11,000 pounds. Data on the landings at New York City are also included in the catch by States.

SHAD FISHERY OF THE HUDSON RIVER

The shad fishery of the Hudson River in 1936 was prosecuted by 476 fishermen who used 207 boats, 14 haul seines, 124 drift gill nets, 1,223 stake gill nets, and 16 fyke nets. The total commercial catch amounted to 697,225 shad having a weight of 2,467,900 pounds and a value to the fishermen of $170,187. This is an increase of 168 percent in the number of shad and 141 percent in their value as compared with 1935. The average price per pound received by the fishermen was about 7 cents compared with a price of about 8 cents in 1935.

Gill nets accounted for 99 percent of the weight of the shad taken, while haul seines accounted for less than 1 percent. Fyke nets accounted for the remainder of the catch.

Statistics of the catch of shad in the Hudson River also are included in the catch data for New York and New Jersey which are published elsewhere in this report.

Shad fishery of the Hudson River, 1936

Item	New York			New Jersey			Total		
Fishermen:									
On boats and shore:	*Number*	*Pounds*	*Value*	*Number*	*Pounds*	*Value*	*Number*	*Pounds*	*Value*
Regular	34			124			158		
Casual	318						318		
Total	352			124			476		
Boats, other than motor	166			41			207		
Apparatus:									
Haul seines	14						14		
Length, yards	2,090						2,090		
Gill nets:									
Drift	124						124		
Square yards	368,490						368,490		
Stake	551			672			1,223		
Square yards	32,240			70,940			103,180		
Fyke nets	16						16		
Shad caught:									
With haul seines	7,884	16,800	$1,108				7,884	16,800	$1,108
With drift gill nets	253,562	683,800	43,187				253,562	683,800	43,187
With stake gill nets	42,299	133,100	8,448	393,211	1,633,500	$117,379	435,510	1,766,600	125,827
With fyke nets	269	700	65				269	700	65
Total	304,014	834,400	52,808	393,211	1,633,500	117,379	697,225	2,467,900	170,187

FISHERIES OF THE CHESAPEAKE BAY STATES

(Area XXIII) [7]

The yield of the commercial fisheries of the Chesapeake Bay States (Maryland and Virginia) during 1936 amounted to 314,094,800 pounds valued at $6,487,641 to the fishermen. This is an increase of 18 percent in volume and 17 percent in value as compared with the catch in the previous year. These fisheries gave employment to 18,283 fishermen or 4 percent less than during 1935.

There were 585 wholesale and manufacturing establishments in the two States in 1936, the same number as in the previous year. In 1936 these establishments gave employment to 12,663 persons, paid $3,073,443 in salaries and wages, and produced manufactured products (canned, cured, packaged, and byproducts), valued at $9,813,684. In 1935 the wholesale and manufacturing firms employed 13,213 persons, paid $3,055,029 in salaries and wages, and produced manufactured products valued at $9,411,465.

Fisheries of the Chesapeake Bay States, 1936

SUMMARY OF CATCH

Product	Maryland		Virginia		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Fish	12,114,800	$399,392	225,115,500	$1,899,541	237,230,300	$2,298,933
Shellfish, etc	31,676,100	1,776,081	45,188,400	2,412,627	76,864,500	4,188,708
Total	43,790,900	2,175,473	270,303,900	4,312,168	314,094,800	6,487,641

OPERATING UNITS: BY STATES

Item	Maryland	Virginia	Total
Fishermen:	*Number*	*Number*	*Number*
On vessels	729	1,830	2,559
On boats and shore:			
Regular	4,222	5,004	9,226
Casual	2,320	4,178	6,498
Total	7,271	11,012	18,283
Vessels:			
Steam	----	25	25
Net tonnage	----	2,882	2,882
Motor	3	181	184
Net tonnage	19	2,577	2,596
Sail	145	----	145
Net tonnage	1,781	----	1,781
Total vessels	148	206	354
Total net tonnage	1,800	5,459	7,259
Boats:			
Motor	3,023	3,625	6,648
Other	1,871	3,259	5,130
Accessory boats	----	112	112
Apparatus:			
Purse seines, menhaden	----	33	33
Length, yards	----	10,370	10,370
Haul seines	184	176	360
Length, yards	32,096	63,751	95,847

[7] This is the number given to this area by the North American Council on Fishery Investigations. It should be explained that there may be included under this area, craft whose principal fishing ports are in the area but at times fish elsewhere. Data on the operating units and catch of the fisheries of the Chesapeake Bay States have been taken largely from statistics collected by the State fishery agencies of Maryland and Virginia. Supplementary surveys, compilations, and analyses have been made by agents of this Bureau in order that the figures may be presented in a manner comparable with those of other sections. It should be observed that the persons engaged, gear and craft employed, and catch of the seed oyster fishery are not included among the statistics of the fishery for market oysters and other species but are shown in separate tables in this section. For a clearer understanding of the statistics published in this section, the reader is referred to the section in the latter part of this document entitled "Statistical survey procedure."

Fisheries of the Chesapeake Bay States, 1936—Continued

OPERATING UNITS: By States—Continued

Item	Maryland	Virginia	Total
Apparatus—Continued.			
Gill nets:	*Number*	*Number*	*Number*
Anchor	299	2	301
Square yards	39,941	800	40,741
Drift	242	203	445
Square yards	219,587	172,378	391,965
Stake	2,811	5,100	7,911
Square yards	224,166	219,762	443,928
Lines:			
Hand	80	28	108
Hooks	120	56	176
Trot with baits or snoods	1,881	2,140	4,021
Baits or snoods	1,344,000	1,174,520	2,518,520
Trot with hooks	----------	8	8
Hooks	----------	7,400	7,400
Pound nets	531	1,902	2,433
Crab pound nets	----------	45	45
Stop nets	----------	3	3
Square yards	----------	3,800	3,800
Fyke nets	2,352	635	2,987
Dip nets	991	1,495	2,486
Otter trawls	----------	26	26
Yards at mouth	----------	695	695
Slat traps	----------	2	2
Pots:			
Crab	----------	275	275
Eel	14,119	780	14,899
Fish	----------	131	131
Scrapes	708	47	755
Yards at mouth	708	55	763
Dredges:			
Crab	----------	232	232
Yards at mouth	----------	411	411
Oyster	408	247	655
Yards at mouth	468	263	731
Tongs:			
Oyster	3,991	2,985	6,976
Other	107	397	504
Rakes, oyster	----------	470	470
Picks	----------	437	437

CATCH: By States

Species	Maryland		Virginia		Total	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	3,368,900	$38,565	8,688,700	$70,413	12,057,600	$108,978
Black bass	61,200	5,388	----------	----------	61,200	5,388
Bluefish	128,700	11,473	317,300	12,631	446,000	24,104
Bonito	8,000	640	45,200	2,252	53,200	2,892
Bowfin	----------	----------	6,500	195	6,500	195
Butterfish	527,200	9,232	1,749,500	40,704	2,276,700	49,936
Cabio or crab eater	----------	----------	9,000	431	9,000	431
Carp	212,900	12,431	528,100	16,049	741,000	28,480
Catfish and bullheads	313,400	10,631	429,500	13,729	742,900	24,360
Cod	----------	----------	4,300	68	4,300	68
Crappie	10,200	521	----------	----------	10,200	521
Croaker	2,812,800	32,802	28,442,000	299,097	31,254,800	331,899
Drum:						
Black	7,900	173	7,100	166	15,000	339
Red or redfish	4,200	79	33,800	843	38,000	922
Eels:						
Common	136,300	9,006	139,400	12,238	275,700	21,244
Conger	100	3	2,100	23	2,200	26
Flounders	29,800	1,656	425,000	23,976	454,800	25,632
Garfish	3,000	45	----------	----------	3,000	45
Gizzard shad	60,900	896	249,200	2,683	310,100	3,579
Grayfish	----------	----------	800	21	800	21
Haddock	----------	----------	100	2	100	2
Hake	----------	----------	25,100	404	25,100	404
Harvestfish	----------	----------	271,300	2,494	271,300	2,494
Herring, sea	----------	----------	461,900	2,327	461,900	2,327
Hickory shad	39,400	765	48,000	1,078	87,400	1,843
Hogfish	----------	----------	100	3	100	3
King whiting or "kingfish"	12,000	236	130,700	3,929	142,700	4,165
Mackerel	----------	----------	124,400	7,575	124,400	7,575
Menhaden	43,400	432	167,515,100	915,854	167,558,500	916,286

Fisheries of the Chesapeake Bay States, 1936—Continued

CATCH: BY STATES—Continued

Species	Maryland		Virginia		Total	
FISH—continued	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Mullet	15,300	$623	89,400	$4,801	104,700	$5,424
Pigfish			6,600	129	6,600	129
Pike or pickerel	39,100	6,211	800	110	39,900	6,321
Pollock			100	2	100	2
Pompano			100	8	100	8
Rudderfish			400	4	400	4
Scup	45,000	1,075	1,433,900	18,883	1,478,900	19,958
Sea bass	20,000	1,050	86,100	5,256	106,100	6,306
Sea robin			1,100	11	1,100	11
Shad	570,200	56,414	1,614,700	178,539	2,184,900	234,953
Sharks			11,500	344	11,500	344
Sheepshead			300	20	300	20
Skates			2,200	13	2,200	13
Spanish mackerel			21,100	1,269	21,100	1,269
Spot	37,100	1,523	909,500	16,688	946,600	18,211
Squeteagues or "sea trout":						
Gray	1,340,400	37,062	10,348,800	189,193	11,689,200	226,255
Spotted	4,000	399	112,400	6,310	116,400	6,709
Striped bass	1,864,100	140,339	519,500	35,387	2,383,600	175,726
Sturgeon	500	75	26,600	2,417	27,100	2,492
Suckers	6,900	300	2,200	108	9,100	408
Sunfish	3,600	74			3,600	74
Swellfish			2,500	41	2,500	41
Tautog	100	3	1,900	22	2,000	25
Tomcod			200	3	200	3
Tuna or "horse mackerel"			100	1	100	1
White perch	273,500	11,826	209,600	7,572	483,100	19,398
Whiting			20,200	283	20,200	283
Wolffish			100	1	100	1
Yellow perch	114,700	7,444	39,400	2,941	154,100	10,385
Total	12,114,800	399,392	225,115,500	1,899,541	237,230,300	2,298,933
SHELLFISH, ETC.						
Crabs:						
Hard	13,294,200	313,595	26,137,800	573,180	39,432,000	886,775
Soft and peelers	2,268,900	199,286	1,969,500	218,866	4,238,400	418,152
Lobsters			200	15	200	15
Clams: [1]						
Hard, public	48,000	5,333	2,449,200	373,895	2,497,200	379,228
Hard, private			176,000	33,000	176,000	33,000
Mussels, sea			77,400	2,257	77,400	2,257
Oysters, market: [2]						
Public, spring	3,676,500	281,021	1,435,800	114,231	5,112,300	395,252
Public, fall	11,341,200	864,722	2,094,100	156,743	13,435,300	1,021,465
Private, spring	221,100	30,720	6,155,500	540,749	6,376,600	571,469
Private, fall	821,200	79,638	4,568,400	395,457	5,389,600	475,095
Squid			122,000	4,043	122,000	4,043
Terrapin, diamond back	4,900	1,762	300	135	5,200	1,897
Turtles:						
Hawksbill			500	5	500	5
Snapper	100	4	1,700	51	1,800	55
Total	31,676,100	1,776,081	45,188,400	2,412,627	76,864,500	4,188,708
Grand total	43,790,900	2,175,473	270,303,900	4,312,168	314,094,800	6,487,641

[1] Statistics on hard clams used in this table are based on yields of 8 pounds of meats per bushel in Maryland, and 8.02 pounds in Virginia.

[2] Statistics on market oysters used in this table are based on yields of 6.15 pounds of meats per bushel in Maryland, and 5.42 pounds in Virginia.

NOTE.—The seed oyster fishery was prosecuted in this section only in Virginia where 1,397 fishermen using 16 motor vessels, 488 motor boats, 267 other boats, 1,029 tongs, and 188 rakes took 830,094 bushels of seed oysters valued at $200,724 from public beds and 15,040 bushels valued at $3,008, from private beds. Of the total number of persons fishing for seed oysters, 1,343 are duplicated among those fishing for market oysters or other species. Similarly, the following craft and gear are duplicated: 10 vessels, 480 motor boats, 248 other boats, 981 tongs, and 188 rakes.

Fisheries of the Chesapeake Bay States, 1936—Continued

SUPPLEMENTARY TABLE SHOWING THE PRODUCTION OF CERTAIN SHELLFISH IN NUMBER AND BUSHELS

Product	Maryland		Virginia		Total	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Crabs:						
Hard, number	39,882,600	$313,595	78,413,400	$573,180	118,296,000	$886,775
Soft and peelers, do	9,075,600	199,286	7,878,000	218,866	16,953,600	418,152
Clams:						
Hard, public, bushels	6,000	5,333	305,387	373,895	311,387	379,228
Hard, private, do			21,945	33,000	21,945	33,000
Mussels, sea, do			6,450	2,257	6,450	2,257
Oysters, market:						
Public, spring, do	597,805	281,021	264,908	114,231	862,713	395,252
Public, fall, do	1,844,098	864,722	386,365	156,743	2,230,463	1,021,465
Private, spring, do	35,951	30,720	1,135,701	540,749	1,171,652	571,469
Private, fall, do	133,528	79,638	842,878	395,457	976,406	475,095

Industries related to the fisheries of the Chesapeake Bay States, 1936

OPERATING UNITS, SALARIES, AND WAGES

Item	Maryland	Virginia	Total
Transporting:			
Persons engaged	*Number* 354	*Number* 827	*Number* 1,181
Vessels:			
Motor	174	312	486
Net tonnage	2,781	3,138	5,919
Sail	1		1
Net tonnage	47		47
Total vessels	175	312	487
Total net tonnage	2,828	3,138	5,966
Wholesale and manufacturing:			
Establishments	328	257	585
Persons engaged:			
Proprietors	449	296	745
Salaried employees	206	186	392
Wage earners:			
Average for season	6,059	5,467	11,526
Average for year	2,501	1,985	4,486
Paid to salaried employees	$280,414	$277,664	$558,078
Paid to wage earners	$1,431,941	$1,083,424	$2,515,365
Total salaries and wages	$1,712,355	$1,361,088	$3,073,443
Fishermen manufacturing	97		97

PRODUCTS MANUFACTURED

Item	Maryland		Virginia	
By manufacturing establishments:				
Alewives:				
Salted:	*Quantity*	*Value*	*Quantity*	*Value*
Corned, pounds	(1)	(1)	729,200	$8,745
Pickled [2], do	2,447,050	$75,261	1,317,160	17,567
Tight-pack cut, do	(1)	(1)	944,640	37,146
Canned, standard cases	20,949	50,438	3,191	8,089
Roe, canned, do	7,024	51,610	16,944	120,865
Dry scrap, tons	(1)	(1)	407	12,752
Oil, gallons	(1)	(1)	5,550	1,163
Croaker, fresh fillets, pounds			230,000	28,000
Flounders, fresh fillets, do			78,000	15,400
Menhaden:				
Dry scrap, tons			19,717	691,329
Oil, gallons			2,784,223	696,101
Sea bass, fresh fillets, pounds			110,000	18,040
Squeteagues, gray, fresh fillets, do			268,000	33,870
Crabs, blue:				
Meat, packaged, fresh cooked, pounds	2,137,454	802,980	1,443,836	568,277
Dry scrap, tons	(1)	(1)	844	17,650

See footnotes at end of table.

Industries related to the fisheries of the Chesapeake Bay States, 1936—Continued

PRODUCTS MANUFACTURED—Continued

Item	Maryland		Virginia	
	Quantity	*Value*	*Quantity*	*Value*
By manufacturing establishments—Continued.				
Clams, hard, canned chowder, standard cases	42,795	$84,961		
Oysters, fresh-shucked, gallons	2,188,557	2,579,264	1,604,038	$2,125,558
Oystershell products:				
Poultry feed, tons	45,137	193,288	26,452	136,369
Lime, do	25,300	36,920	22,141	122,379
Lime, "burned", do			9,802	72,134
Unclassified products:				
Fresh fillets, pounds			[3] 115,000	[3] 13,750
Salted and smoked, do	[4] 492,500	[4] 97,125	([5])	([5])
Canned, standard cases	[6] 16,064	[6] 73,956	([5])	([5])
Dry scrap, tons	[7] 950	[7] 18,750	[8] 248	[8] 7,853
Miscellaneous		[9] 919,312		[10] 76,782
Total		4,983,865		4,829,819
By fishermen:				
Alewives:				
Pickled, pounds	2,500	110		
Smoked, do	1,000	20		
Eels, salted, do	107,240	8,195		
Total		8,325		
Grand total		4,992,190		4,829,819

[1] The production of this item is included under "Unclassified products."
[2] This item is usually an intermediate product and, although included in the total, may be shown in its final stage of processing in this or another State.
[3] Includes fresh fillets of haddock, sea robin, scup, and Spanish mackerel.
[4] Includes salted spot and corned and tight-pack cut alewives; smoked alewives, butterfish, carp, chub, cisco, tullibees, eels, sea herring, salmon, sturgeon, lake trout, and whitefish.
[5] The production of this item is included under "Miscellaneous."
[6] Includes canned fish paste, oysters, and oyster, shrimp, and terrapin soup.
[7] Includes alewife and blue crab scrap.
[8] Includes miscellaneous fish scrap.
[9] Includes alewife oil, marine-shell products, and pearl essence.
[10] Includes fresh-shucked hard clams, tight-pack alewife roe, menhaden meal, miscellaneous acid scrap, miscellaneous oil, and canned blue crabs.

NOTE.—The total value of manufactured products in the Chesapeake Bay States was as follows: By manufacturing establishments, $9,813,684; and by fishermen, $8,325. Some of the above products may have been imported from another State or a foreign country; therefore, they cannot be correlated directly with the catch within the State. Of the total number of persons engaged on transporting vessels 685 have been included as fishermen, and among the total number of persons engaged in the preparation of fishermen's prepared products, all have been included as fishermen.

MARYLAND

Fisheries of Maryland, 1936

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets			Lines		Pound nets	Fyke nets
		Anchor	Drift	Stake	Hand	Trot with baits or snoods		
Fishermen on boats and shore:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Regular	275	35	81	115	20	1,463	350	40
Casual	233	17	298	122	20	155	143	131
Total	508	52	379	237	40	1,618	493	171
Boats:								
Motor	68	23	80	93	20	1,384	172	54
Other	152	1	119	55		195	142	62
Apparatus:								
Number	184	299	242	2,811	80	1,881	531	2,352
Length, yards	32,096							
Square yards		39,941	219,587	224,166				
Hooks, baits, or snoods					120	1,344,000		

Fisheries of Maryland, 1936—Continued

OPERATING UNITS: By gear—Continued

Item	Dip nets	Pots, eel	Scrapes	Dredges, oyster	Tongs		By hand, other than for oysters	Total, exclusive of duplication
					Oyster	Other		
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels				720	9			729
On boats and shore:								
Regular	380	144	344	124	3,200	87	28	4,222
Casual	603	65			792	20		2,320
Total	983	209	344	844	4,001	107	28	7,271
Vessels:								
Motor					3			3
Net tonnage					19			19
Sail				144	1			145
Net tonnage				1,775	6			1,781
Total vessels				144	4			148
Total net tonnage				1,775	25			1,800
Boats:								
Motor	10	123		22	1,934	16		3,023
Other	880	36	280	59	64	50		1,871
Apparatus:								
Number	991	14,119	708	408	3,991	107		
Yards at mouth			708	468				

CATCH: By gear

Species	Haul seines		Gill nets					
			Anchor		Drift		Stake	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	80,500	$918	1,300	$9	29,200	$476	15,600	$265
Black bass	41,100	3,473						
Bluefish	4,400	237			36,600	2,776	800	84
Butterfish							2,100	164
Carp	179,100	10,989			2,300	118	100	13
Catfish and bullheads	85,800	2,807			1,000	38	4,100	154
Crappie	7,400	326						
Croaker	785,600	13,703					10,500	178
Drum, black	1,000	20						
Eels, common	3,100	156						
Flounders	900	52					200	8
Gizzard shad	6,800	138	400	25	500	5	200	4
Hickory shad	1,400	28	900	36	100	4	900	11
Mullet	200	11			14,000	560		
Pike or pickerel	19,200	3,285					300	50
Shad	4,600	376	12,600	1,447	137,200	13,747	50,100	5,465
Spot	16,900	689					1,300	60
Squeteagues or "sea trout":								
Gray	62,100	3,011	100	8			2,400	158
Spotted	2,100	198						
Striped bass	459,300	32,039	62,900	5,241	178,800	15,840	191,600	17,188
Suckers	900	44					500	25
Sunfish	1,300	25						
White perch	63,600	3,016			3,600	178	10,500	766
Yellow perch	23,300	1,444	500	28	800	62	1,600	72
Crabs, soft and peelers	121,300	11,005						
Turtle, snapper	100	4						
Total	1,972,000	87,994	78,700	6,794	404,100	33,804	292,800	24,655

Fisheries of Maryland, 1936—Continued

CATCH: By gear—Continued

Species	Lines				Pound nets		Fyke nets	
	Hand		Trot with baits or snoods					
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives					3,232,800	$36,775	9,500	$122
Black bass					4,300	482	15,800	1,433
Bluefish	60,000	$6,000			26,900	2,376		
Bonito	8,000	640						
Butterfish					522,300	8,942	2,800	126
Carp					23,400	816	8,000	505
Catfish and bullheads					67,000	2,196	155,500	5,436
Crappie					1,200	106	1,600	89
Croaker					2,011,700	18,821	5,000	100
Drum:								
Black					6,900	153		
Red or redfish	400	12			3,800	67		
Eels:								
Common			200	$10	5,700	365	4,700	381
Conger					100	3		
Flounders					28,600	1,590	100	6
Garfish					3,000	45		
Gizzard shad					52,700	715	300	9
Hickory shad					34,900	662	1,200	24
King whiting or "kingfish"					12,000	236		
Menhaden					43,400	432		
Mullet					1,000	50	100	2
Pike or pickerel					2,000	289	17,600	2,587
Scup	10,000	500			35,000	575		
Sea bass	15,000	750			5,000	300		
Shad					362,400	35,039		
Spot					18,900	774		
Squeteagues or "sea trout":								
Gray	4,000	400			1,271,700	33,481	100	4
Spotted					1,900	201		
Striped bass					959,600	68,918	11,900	1,113
Sturgeon					500	75		
Suckers					1,000	20	4,500	211
Sunfish					600	17	1,700	32
Tautog	100	3						
White perch					134,400	5,062	61,400	2,804
Yellow perch					14,700	913	73,800	4,925
Crabs:								
Hard			13,229,200	311,970				
Soft and peelers			269,600	23,485				
Total	97,500	8,305	13,449,000	335,465	8,889,400	220,496	375,600	19,909

Species	Dip nets		Pots, eel		Scrapes	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Eels, common			122,600	$8,094		
Shad	3,300	$340				
Crabs:						
Hard					65,000	$1,625
Soft and peelers	673,100	68,409			1,204,900	96,387
Total	676,400	68,749	122,600	8,094	1,269,900	98,012

Species	Dredges		Tongs		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Clams, hard, public			48,000	$5,333		
Oysters, market:						
Public, spring	293,300	$22,151	3,383,200	258,870		
Public, fall	2,717,000	206,047	8,624,200	658,675		
Private, spring	56,400	11,299	164,700	19,421		
Private, fall	345,600	33,130	475,600	46,508		
Terrapin, diamond back					4,900	$1,762
Total	3,412,300	272,627	12,695,700	988,807	4,900	1,762

Fisheries of Maryland, 1936—Continued

OPERATING UNITS: By COUNTIES

Item	Anne Arundel	Baltimore	Calvert	Caroline	Cecil	Charles	Dorchester	Harford
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	7	34	13				214	
On boats and shore:								
Regular	543	6	287	3	11	48	721	5
Casual	264	68	128	32	99	228	142	51
Total	814	108	428	35	110	276	1,077	56
Vessels, sail	2	7	3				42	
Net tonnage	25	155	46				410	
Boats:								
Motor	326	19	144	11	43	109	556	16
Other	224	31	136	16	26	42	71	17
Apparatus:								
Haul seines	43	11	20	5	19	13	4	11
Length, yards	4,018	1,720	1,695	1,639	4,660	1,864	1,450	3,005
Gill nets:								
Anchor		3			46			
Square yards		443			11,053			
Drift	8			41	11	13	23	9
Square yards	5,423			18,699	12,998	30,383	28,558	14,752
Stake	33	16		120	120	833	111	125
Square yards	6,611	3,596		3,960	9,090	62,841	3,714	11,113
Lines, trot with baits or snoods	129	30	41			44	662	
Baits or snoods	68,500	15,000	19,500			48,700	479,200	
Pound nets	26	15	15	8	36	33	125	9
Fyke nets	12	337		26	1,249	44	4	280
Dip nets	108		126			10	23	
Pots, eel	900	648			456	111	3,899	154
Dredges, oyster	2	14	8				88	
Yards at mouth	3	20	9				99	
Tongs, oyster	630		330			165	663	

Item	Kent	Prince Georges	Queen Annes	St. Marys	Somerset	Talbot	Wicomico	Worcester
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	5		2	9	385	54	6	
On boats and shore:								
Regular	382	2	373	403	621	481	167	169
Casual	174	28	249	267	212	76	179	123
Total	561	30	624	679	1,218	611	352	292
Vessels:								
Motor	2		1					
Net tonnage	14		5					
Sail				2	77	11	1	
Net tonnage				42	988	90	25	
Total vessels	2		1	2	77	11	1	
Total net tonnage	14		5	42	988	90	25	
Boats:								
Motor	367	1	367	252	159	382	126	145
Other	46	13	97	264	625	75	50	138
Apparatus:								
Haul seines	11	8	5	5	23	4	1	1
Length, yards	3,335	970	1,550	1,350	3,200	1,000	500	140
Gill nets:								
Anchor	250							
Square yards	28,445							
Drift	16	2	5		9	18	58	29
Square yards	44,608	3,900	1,350		4,832	10,692	36,600	6,792
Stake	903	1	7		258	17	267	
Square yards	109,590	42	1,515		4,994	1,140	5,960	
Lines:								
Hand								80
Hooks								120
Trot with baits or snoods	219		115	120	130	243	9	139
Baits or snoods	175,200		72,000	110,800	80,000	176,800	7,200	91,100
Pound nets	27		6	56	41	86	21	27
Fyke nets	251	42	41		27	22	16	1
Dip nets	42		85	175	366	31		25
Pots, eel	1,192	87	1,720		80	4,860	12	
Scrapes					708			
Yards at mouth					708			
Dredges, oyster				4	226	22	2	42
Yards at mouth				5	263	25	2	42
Tongs:								
Oyster	350		501	500	129	453	240	30
Other								107

Fisheries of Maryland—Continued

CATCH: BY COUNTIES

Species	Anne Arundel		Baltimore		Calvert		Caroline	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	112,300	$1,824	11,500	$163	138,000	$1,725	26,400	$318
Black bass			7,800	711			200	22
Bluefish	4,900	268	200	16	2,300	143		
Butterfish	2,100	179						
Carp	8,800	402	1,000	46	600	21	4,200	249
Catfish and bullheads	16,700	590	32,800	1,224	7,600	254	9,600	331
Crappie	3,000	108					300	16
Croaker	200,500	3,893	1,000	33	199,000	3,083	21,000	420
Eels, common	12,000	886	10,800	806			100	6
Flounders	1,000	64	600	25	700	45		
Gizzard shad	6,900	89	7,000	145	2,400	24	2,000	35
Hickory shad	1,700	39			2,500	50	100	4
Menhaden	42,000	418						
Mullet					200	11		
Pike or pickerel	900	145	4,100	532	200	30	300	36
Shad	10,400	1,083	100	10	16,100	1,610	11,900	1,477
Spot	7,200	235	200	5	3,100	131		
Squeteagues or "sea trout":								
Gray	215,200	10,350	1,800	150	9,600	473	10,000	500
Spotted					500	56		
Striped bass	464,700	28,644	27,000	2,132	102,300	7,455	76,400	6,170
Suckers	700	44					300	25
White perch	11,200	613	16,400	692	13,600	573	39,300	1,045
Yellow perch	2,600	136	16,200	1,238	1,500	83	4,400	276
Crabs:								
Hard	528,400	10,563	116,000	3,348	375,200	11,256		
Soft and peelers	70,400	8,240	1,600	247	82,500	8,743		
Oysters, market:								
Public, spring	559,600	46,631			264,000	26,398		
Public, fall	1,133,700	94,472	96,000	7,300	500,200	49,553		
Private, fall					97,200	9,720		
Total	3,416,900	209,916	352,100	18,823	1,819,300	121,437	206,500	10,930

Species	Cecil		Charles		Dorchester		Harford	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	333,100	$5,588	107,800	$890	216,700	$3,312	276,200	$2,182
Black bass	36,200	3,245	5,500	490	1,300	122	7,900	600
Bluefish					28,500	2,391	1,600	96
Butterfish					2,800	206		
Carp	47,500	3,268	58,600	3,073	6,900	279	29,700	1,977
Catfish and bullheads	92,300	2,932	27,600	800	13,200	485	25,400	929
Crappie	5,100	236			200	6	100	5
Croaker			2,000	100	166,400	3,473		
Drum:								
Black					1,900	18		
Red or redfish					500	10		
Eels, common	13,800	990	6,200	416	24,200	1,392	5,800	364
Flounders					11,800	555		
Gizzard shad	1,000	31	15,800	206	6,700	73	300	3
Hickory shad	1,400	51	200	8	2,200	54	1,000	30
King whiting or "kingfish"					200	6		
Mullet	100	2						
Pike or pickerel	13,700	1,847	1,700	239	100	16	13,900	2,796
Shad	55,300	5,370	28,000	2,849	70,700	7,364	18,900	1,850
Spot					2,300	126	500	20
Squeteagues or "sea trout":								
Gray			1,500	125	25,100	1,169	400	16
Spotted					1,400	146	600	36
Striped bass	17,200	1,705	59,700	5,580	199,000	16,546	37,500	3,531
Suckers	2,100	65	200	9			2,000	114
Sunfish	1,700	32			600	17	1,300	25
White perch	26,700	1,077	19,900	1,062	50,300	1,796	6,900	386
Yellow perch	34,400	1,855	1,700	146	1,100	79	10,300	720
Crabs:								
Hard			640,900	16,794	4,054,600	101,375		
Soft and peelers			900	300	153,500	12,240		
Oysters, market:								
Public, spring			36,500	3,541	461,200	35,505		
Public, fall			72,400	7,036	2,001,000	153,486		
Terrapin, diamond back					1,900	762		
Turtle, snapper			100	4				
Total	681,600	28,294	1,087,200	43,668	7,506,300	343,009	440,300	15,680

Fisheries of Maryland—Continued

CATCH: BY COUNTIES—Continued

Species	Kent		Prince Georges		Queen Annes		St. Marys	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	45,900	$747	1,500	$30	2,200	$22	178,200	$2,063
Black bass	800	48	1,500	150				
Bluefish	2,000	93					1,900	141
Butterfish	2,800	126					200	10
Carp	7,100	265	32,500	1,980	1,900	139	2,400	63
Catfish and bullheads	30,900	833	13,100	449	6,600	296	600	30
Crappie			500	50				
Croaker	136,300	3,012	200	30	41,000	702	44,500	998
Eels, common	20,300	1,273	6,400	604				
Flounders	400	33					1,300	79
Gizzard shad	200	5	200	5	200	2	14,700	198
Hickory shad	3,300	55					8,700	127
Menhaden							1,400	14
Pike or pickerel	3,500	490	200	30	200	20		
Shad	33,700	3,522	4,100	395	100	13	58,000	5,781
Spot	7,900	321	100	3			1,100	24
Squeteagues or "sea trout":								
Gray	102,400	4,769	200	19			21,900	1,080
Spotted	500	56					100	15
Striped bass	428,900	33,267	700	84	46,700	3,065	123,900	12,815
Suckers	300	15	300	8				
White perch	34,200	1,803	2,700	140	8,600	401	4,000	141
Yellow perch	20,700	1,316	600	56	13,200	817	1,000	130
Crabs:								
Hard	426,800	8,535			829,900	16,580	670,500	17,013
Soft and peelers	36,900	5,740			38,100	5,798	77,200	10,829
Oysters, market:								
Public, spring	423,100	24,700			672,500	44,830	353,500	30,708
Public, fall	735,600	43,035			1,714,200	114,282	992,800	85,447
Private, fall							48,000	4,800
Total	2,504,500	134,059	64,800	4,033	3,375,400	186,967	2,605,900	172,506

Species	Somerset		Talbot		Wicomico		Worcester	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	430,000	$4,755	1,317,600	$13,548	28,400	$512	143,100	$886
Bluefish	10,100	923	6,700	377	500	25	70,000	7,000
Bonito							8,000	640
Butterfish	1,900	71	2,400	40	15,000	600	500,000	8,000
Carp			11,000	644	700	25		
Catfish and bullheads	7,400	387	18,800	615	8,300	361	2,500	115
Crappie							1,000	100
Croaker	309,800	3,520	108,200	1,522	112,900	1,716	1,470,000	10,300
Drum:								
Black	2,000	35					4,000	120
Red or redfish	1,800	27					1,900	42
Eels:								
Common	3,100	282	31,000	1,832	100	5	2,500	150
Conger							100	3
Flounders	8,200	452	300	18	2,000	200	3,500	185
Garfish					3,000	45		
Gizzard shad	1,100	13	600	8	1,800	59		
Hickory shad	7,000	140	11,100	201	100	3	100	3
King whiting or "kingfish"					800	80	11,000	150
Mullet							15,000	610
Pike or pickerel			300	30				
Scup							45,000	1,075
Sea bass							20,000	1,050
Shad	51,300	4,930	104,500	10,434	63,800	6,601	43,300	3,125
Spot	1,500	64	3,100	150	6,600	314	3,500	130
Squeteagues or "sea trout":								
Gray	30,800	1,480	47,500	2,421	61,100	1,845	812,900	12,665
Spotted	900	90						
Striped bass	28,600	1,729	153,200	10,778	93,100	6,316	5,200	522
Sturgeon							500	75
Suckers							1,000	20
Tautog							100	3
White perch	9,300	422	10,400	472	16,700	938	3,300	265
Yellow perch	100	5	6,600	570	300	17		
Crabs:								
Hard	2,005,000	50,125	2,614,600	52,290	18,600	372	1,013,700	25,344
Soft and peelers	1,721,300	137,893	26,600	3,751	600	46	59,300	5,459
Clams, hard, public							48,000	5,333
Oysters, market:								
Public, spring	377,700	28,277	412,900	31,769	115,500	8,662		
Public, fall	2,262,300	169,692	1,505,200	115,772	327,800	24,647		
Private, spring	28,800	2,160			79,500	5,962	112,800	22,598
Private, fall	70,200	5,215			216,600	16,241	389,200	43,662
Terrapin, diamond back	3,000	1,000						
Total	7,373,200	413,687	6,392,600	247,242	1,173,800	75,592	4,790,500	149,630

VIRGINIA

Fisheries of Virginia, 1936

OPERATING UNITS: BY GEAR

Item	Purse seines, menhaden	Haul seines	Gill nets			Lines		
			Anchor	Drift	Stake	Hand	Trot with baits or snoods	Trot with hooks
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	1,194						2	
On boats and shore:								
Regular		329		37	64	14	1,493	
Casual		279	4	275	260		651	11
Total	1,194	608	4	312	324	14	2,146	11
Vessels:								
Steam	25							
Net tonnage	2,882							
Motor	8						2	
Net tonnage	604						10	
Total vessels	33						2	
Total net tonnage	3,486						10	
Boats:								
Motor		83		35	59	7	1,685	3
Other		187	2	158	158		414	5
Accessory boats	99							
Apparatus:								
Number	33	176	2	203	5,100	28	2,140	8
Length, yards	10,370	63,751						
Square yards			800	172,378	219,762			
Hooks, baits, or snoods						56	1,174,520	7,400

Item	Pound nets	Crab pound nets	Stop nets	Fyke nets	Dip nets	Otter trawls
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	103					112
On boats and shore:						
Regular	1,287	18	3	58	534	
Casual	568	6	4	90	961	
Total	1,958	24	7	148	1,495	112
Vessels, motor	15					26
Net tonnage	122					434
Boats:						
Motor	307	13		37	51	
Other	507	5	4	71	1,411	
Accessory boats	13					
Apparatus:						
Number	1,902	45	3	635	1,495	26
Square yards			3,800			
Yards at mouth						695

Item	Slat traps	Pots			Scrapes	Dredges	
		Crab	Eel	Fish		Crab	Oyster
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels						309	103
On boats and shore:							
Regular		16	19	9	72	10	200
Casual	3		14	8		4	
Total	3	16	33	17	72	323	303
Vessels, motor						101	22
Net tonnage						1,083	370
Boats:							
Motor		11	14	5		6	100
Other		4	9	5	47		
Apparatus:							
Number	2	275	780	131	47	232	247
Yards at mouth					55	411	263

Fisheries of Virginia, 1936—Continued

OPERATING UNITS BY GEAR—Continued

Item	Tongs		Rakes, oyster	Picks	By hand		Total, exclusive of duplication
	Oyster	Other			Oysters	Other	
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	49	12					1,830
On boats and shore:							
Regular	2,289	363	454	437	159	429	5,004
Casual	1,350	66	16			30	4,178
Total	3,688	441	470	437	159	459	11,012
Vessels:							
Steam							25
Net tonnage							2,882
Motor	18	4					181
Net tonnage	99	21					2,577
Total vessels	18	4					206
Total net tonnage	99	21					5,459
Boats:							
Motor	1,681	163	35	20			3,625
Other	421	209	381	417	249		3,259
Accessory boats							112
Apparatus, number	2,985	397	470	437			

CATCH: BY GEAR

Species	Purse seines		Haul seines		Gill nets			
					Anchor		Drift	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives			747,700	$5,562			34,600	$307
Bluefish			32,800	1,452			800	111
Bowfin			6,500	195				
Butterfish			72,100	723				
Cabio or crab eater			100	5				
Carp			378,300	10,642			10,000	500
Catfish and bullheads			70,500	2,088				
Croaker			1,639,700	16,264	10,000	$75	71,700	2,119
Drum, red or redfish			900	17				
Eels, common			27,400	1,586				
Flounders			9,000	382				
Gizzard shad			94,600	942			2,100	31
Grayfish			300	2				
Harvestfish			35,600	356				
Hickory shad			8,400	179			1,500	28
King whiting or "kingfish"			2,700	49				
Mackerel							35,000	2,800
Menhaden	165,853,200	$912,195						
Mullet			12,900	410	10,000	400	1,700	102
Pigfish			300	6				
Scup			500	15				
Shad			31,300	2,680			118,500	11,782
Sheepshead			200	8				
Spot			208,600	4,352	10,000	300	5,600	235
Squeteagues or "sea trout":								
Gray			120,100	2,936			500	30
Spotted			94,700	5,730			100	4
Striped bass			61,200	2,416			14,900	1,399
Sturgeon							14,100	1,128
Suckers			1,600	90				
White perch			37,700	1,472			400	28
Yellow perch			6,900	342				
Crabs, soft and peelers			3,500	692				
Total	165,853,200	912,195	3,706,100	61,593	30,000	775	311,500	20,604

Fisheries of Virginia, 1936—Continued

CATCH: BY GEAR—Continued

Species	Gill nets—Contd.		Lines					
	Stake		Hand		Trot with baits or snoods		Trot with hooks	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	5,200	$76						
Bluefish	600	10	7,000	$1,050				
Butterfish	500	20						
Catfish and bullheads							6,500	$325
Croaker	26,400	297						
Flounders	200	7						
Gizzard shad	3,500	32						
Hickory shad	200	4						
King whiting or "kingfish"	10,000	300						
Mullet	62,400	3,833						
Sea bass			35,000	2,800				
Shad	85,800	10,415						
Spot	22,000	567						
Squeteagues or "sea trout":								
Gray	7,600	226	52,500	3,150				
Spotted	100	7						
Striped bass	73,500	7,117						
Sturgeon	100	14						
White perch	1,500	102						
Crabs:								
Hard					19,354,400	$371,763		
Soft and peelers					193,800	13,935		
Total	299,600	23,027	94,500	7,000	19,548,200	385,698	6,500	325

Species	Pound nets		Crab pound nets		Stop nets		Fyke nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	7,875,700	$64,053					25,300	$408
Bluefish	266,900	9,119						
Bonito	44,300	2,242						
Butterfish	1,607,700	37,667					500	40
Cabio or crab eater	8,900	426						
Carp	31,300	1,130			78,000	$2,581	22,400	871
Catfish and bullheads	74,600	2,317			14,000	723	175,500	5,352
Cod	3,800	59						
Croaker	21,316,400	159,971					57,300	985
Drum:								
Black	6,700	159						
Red or redfish	18,800	583						
Eels:								
Common	74,100	8,209					9,600	607
Conger	700	7						
Flounders	153,400	6,081					2,500	125
Gizzard shad	136,200	1,489					12,800	189
Harvestfish	235,600	2,135					100	3
Herring, sea	460,200	2,307						
Hickory shad	37,400	846					400	19
King whiting or "kingfish"	41,700	975						
Mackerel	89,400	4,775						
Menhaden	1,661,700	3,658						
Mullet	2,100	42					300	14
Pigfish	6,200	122						
Pike or pickerel							800	110
Pompano	100	8						
Rudderfish	400	4						
Scup	580,200	6,640						
Sea bass	8,800	416						
Shad	1,374,700	153,192					4,400	470
Sharks	1,300	8						
Skates	1,000	10						
Spanish mackerel	21,100	1,269						
Spot	643,700	11,028						
Squeteagues or "sea trout":								
Gray	8,987,800	152,613					12,400	583
Spotted	17,500	569						
Striped bass	335,200	20,869					34,700	3,586
Sturgeon	3,900	389					2,000	300
Suckers							600	18
Swellfish	1,900	18						
Tautog	300	3						
White perch	74,500	2,703					70,500	2,940
Yellow perch	2,200	148					30,300	2,451
Crabs:								
Hard	13,500	324	41,700	$773			200	12
Soft and peelers			36,600	5,870				
Squid	106,100	3,670						
Turtles:								
Hawksbill	500	5						
Snapper							1,700	51
Total	46,328,500	662,258	78,300	6,643	92,000	3,304	464,300	19,134

Fisheries of Virginia, 1936—Continued

CATCH: BY GEAR—Continued

Species	Dip nets		Otter trawls		Slat traps		Pots, crab	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	100	$3			100	$4		
Bluefish			9,200	$889				
Bonito			900	10				
Butterfish			68,700	2,254				
Carp					8,000	320		
Catfish and bullheads					200	8		
Cod			500	9				
Croaker			5,320,500	119,386				
Drum:								
Black			400	7				
Red or redfish			14,100	243				
Eels, conger			1,400	16				
Flounders			259,900	17,381				
Grayfish			500	19				
Haddock			100	2				
Hake			25,100	404				
Herring, sea			1,700	20				
Hickory shad					100	2		
Hogfish			100	3				
King whiting or "kingfish"			76,300	2,605				
Menhaden			200	1				
Pigfish			100	1				
Pollock			100	2				
Scup			853,200	12,228				
Sea bass			42,300	2,040				
Sea robin			1,100	11				
Sharks			10,200	336				
Sheepshead			100	12				
Skates			1,200	3				
Spot			19,600	206				
Squeteagues or "sea trout", gray			1,167,900	29,655				
Sturgeon			6,500	586				
Swellfish			600	23				
Tautog			1,600	19				
Tomcod			200	3				
Tuna or "horse mackerel"			100	1				
White perch			25,000	327				
Whiting			20,200	283				
Wolffish			100	1				
Crabs:								
Hard	331,900	13,882					99,800	$2,064
Soft and peelers	1,310,900	169,468					40,700	3,336
Lobsters			200	15				
Squid			15,900	373				
Total	1,642,900	183,353	7,945,800	189,374	8,400	334	140,500	5,400

Species	Pots—Continued				Scrapes		Dredges			
	Eel		Fish				Crab		Oyster	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Carp			100	$5						
Catfish and bullheads			88,200	2,916						
Eels, common	23,800	$1,589	4,500	247						
Crabs:										
Hard					29,000	$700	6,259,500	$183,462	7,800	$200
Soft and peelers					257,400	15,437				
Oysters, market:										
Private, spring									2,670,200	208,979
Private, fall									2,995,600	248,395
Total	23,800	1,589	92,800	3,168	286,400	16,137	6,259,500	183,462	5,673,600	457,574

Fisheries of Virginia, 1936—Continued

CATCH: By gear—Continued

Species	Tongs		Rakes		Picks		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs, soft and peelers							126,600	$10,128
Clams:								
Hard, public	1,925,200	$256,822	93,700	$18,807	238,700	$55,870	191,600	42,396
Hard, private	176,000	33,000						
Mussels, sea							77,400	2,257
Oysters, market:								
Public, spring	1,411,600	112,214					24,200	2,017
Public, fall	2,064,100	154,243					30,000	2,500
Private, spring	2,562,800	253,200	882,300	75,223			40,200	3,347
Private, fall	1,272,900	120,269	251,500	22,760			48,400	4,033
Terrapin, diamond back							300	135
Total	9,412,600	929,748	1,227,500	116,790	238,700	55,870	538,700	66,813

OPERATING UNITS: By counties

Item	Accomac	Arlington	Caroline	Charles City	Chesterfield	Dinwiddie	Elizabeth City	Essex	Fairfax
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	31						121		
On boats and shore:									
Regular	1,102	2		5			160	62	7
Casual	153	33	1	108	17	3	62	53	32
Total	1,286	35	1	113	17	3	343	115	39
Vessels, motor	7						29		
Net tonnage	80						431		
Boats:									
Motor	689	7		5			75	31	6
Other	583	10	1	66	5	3	15	34	24
Accessory boats	1								
Apparatus:									
Haul seines	23	6		2				5	4
Length, yards	12,600	1,205		650				1,350	800
Gill nets:									
Drift	7	7		67	4	3			10
Square yards	14,000	12,760		59,732	1,020	330			13,643
Stake	2			25				4	
Square yards	550			500				2,900	
Lines:									
Hand	28								
Hooks	56								
Trot with baits or snoods	430						29	8	
Baits or snoods	234,400						15,950	900	
Pound nets	213						197	2	
Stop nets				1					
Square yards				1,000					
Fyke nets	6	37	1	15			8	3	204
Dip nets	278				1				
Otter trawls							11		
Yards at mouth							294		
Slat traps					2				
Pots:									
Eel		50							
Fish				54	3				
Scrapes	47								
Yards at mouth	55								
Dredges:									
Crab	10						32		
Yards at mouth	21						63		
Oyster	200						14		
Yards at mouth	187						21		
Tongs:									
Oyster	438							62	
Other	219						13		
Rakes, oyster	154								
Picks	229								

Fisheries of Virginia, 1936—Continued

OPERATING UNITS: By counties—Continued

Item	Gloucester	Henrico	Isle of Wight	James City	King and Queen	King George	King William	Lancaster	Mathews
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	63		2					447	56
On boats and shore:									
Regular	427		305	12		16		445	329
Casual	43	11	142	41	27	132	28	629	440
Total	533	11	449	53	27	148	28	1,521	825
Vessels:									
Steam								8	
Net tonnage								820	
Motor	21		1					6	19
Net tonnage	201		5					315	278
Total vessels	21		1					14	19
Total net tonnage	201		5					1,135	278
Boats:									
Motor	160		238	18		27	2	303	217
Other	61	7	92	32	22	101	24	487	256
Accessory boats								36	
Apparatus:									
Purse seines, menhaden								12	
Length, yards								3,890	
Haul seines	1	1		1		3		9	3
Length, yards	500	45		300		550		3,100	2,300
Gill nets:									
Drift		6		24	5	2	5		
Square yards		3,300		11,015	940	1,200	3,540		
Stake	100		1,150	931	340	435	110		30
Square yards	2,160		34,500	27,930	10,700	15,129	2,848		600
Lines:									
Trot with baits or snoods	36		145			44	7	146	131
Baits or snoods	11,800		101,500			23,150	2,450	107,800	72,050
Pound nets	128		2	7		30		189	525
Crab pound nets	19								19
Fyke nets	20		57	47	1	37			
Dip nets						50		408	79
Pots:									
Crab	3								
Eel	8					50			
Fish				20					
Dredges:									
Crab	22								34
Yards at mouth	43								68
Oyster	6							4	
Yards at mouth	9							6	
Tongs:									
Oyster	268		322	3			17	322	96
Other	53								17

Item	Middlesex	Nansemond	New Kent	Norfolk	Northampton	Northumberland	Prince George	Princess Anne
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	7	24		51	86	754		
On boats and shore:								
Regular	235	78		54	631	435	7	45
Casual	439	116	22	170	70	559	10	113
Total	681	218	22	275	787	1,748	17	158
Vessels:								
Steam						17		
Net tonnage						2,062		
Motor	3	8		9	13	4		
Net tonnage	48	43		202	109	312		
Total vessels	3	8		9	13	21		
Total net tonnage	48	43		202	109	2,374		
Boats:								
Motor	426	91	4	32	258	371	3	74
Other	70	41	18	143	345	512	10	52
Accessory boats					12	63		
Apparatus:								
Purse seines, menhaden						21		
Length, yards						6,480		
Haul seines	8		1	10	8	8	3	21
Length, yards	6,040		240	3,100	3,400	890	371	6,150

Fisheries of Virginia, 1936—Continued

OPERATING UNITS: By counties—Continued

Item	Middlesex	Nansemond	New Kent	Norfolk	Northampton	Northumberland	Prince George	Princess Anne
Apparatus—Continued.								
Gill nets:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Drift			9	6			8	
Square yards			11,400	3,180			2,700	
Stake		190	100	430	188			
Square yards		7,600	4,000	12,900	4,400			
Lines:								
Trot with baits or snoods	109	31	2	103	186	262		70
Baits or snoods	89,500	17,980	400	51,500	93,000	131,000		24,500
Pound nets	15			24	109	296		10
Crab pound nets	7							
Stop nets							2	
Square yards							2,800	
Fyke nets		22	10				4	
Dip nets	79				200	350		
Otter trawls				2				
Yards at mouth				60				
Pots:								
Crab						192		
Eel						15		
Fish			22				20	
Dredges:								
Crab	6			4	8			
Yards at mouth	12			8	8			
Oyster				16	1			
Yards at mouth				30	1			
Tongs:								
Oyster	561	127	2	2	136	108		11
Other				12	75			1
Rakes, oyster					316			
Picks					208			

Item	Prince William	Richmond	Southampton	Stafford	Surry	Warwick	Westmoreland	York
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:								
On vessels						19		169
On boats and shore:								
Regular	8	42		22	4	65	217	289
Casual	45	57	64	23	12	118	392	13
Total	53	99	64	45	16	202	609	471
Vessels, motor						6		55
Net tonnage						55		498
Boats:								
Motor	11	44		14	6	54	315	144
Other	23	55	8	19	6	3	93	38
Apparatus:								
Haul seines	7	3	8	9	3		8	21
Length, yards	1,150	975	1,200	1,840	1,050		1,345	12,600
Gill nets:								
Anchor								2
Square yards								800
Drift	12	28						
Square yards	16,890	16,728						
Stake	165	85		188	50	575	2	
Square yards	2,025	6,800		61,100	1,520	21,000	600	
Lines:								
Trot with baits or snoods	1	13		14	1	9	329	34
Baits or snoods	300	2,240		7,200	300	3,600	155,800	27,200
Trot with hooks	6			1	1			
Hooks	5,200			2,000	200			
Pound nets		41		13		13	61	27
Fyke nets	100	1		20	16	18	4	4
Dip nets							50	
Otter trawls						1		12
Yards at mouth						25		316
Pots:								
Crab							80	
Eel	163			210			284	
Fish					12			
Dredges:								
Crab						2		114
Yards at mouth						4		184
Oyster								6
Yards at mouth								9
Tongs:								
Oyster		40				69	234	167
Other						4		3

Fisheries of Virginia, 1936—Continued

CATCH: BY COUNTIES

Species	Accomac		Arlington		Caroline		Charles City	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	499,900	$2,499			100	$4	500	$2
Bluefish	92,300	5,105						
Bonito	24,200	1,210						
Butterfish	499,200	13,391						
Carp			38,800	$1,210	100	6	28,100	1,097
Catfish and bullheads	1,200	48	10,800	299	200	10	61,100	2,106
Croaker	1,935,500	20,685						
Drum:								
Black	6,600	157						
Red or redfish	13,400	522						
Eels, common	15,600	1,560	2,100	168	100	7	4,700	274
Flounders	34,800	1,868						
Gizzard shad							500	10
Harvestfish	3,200	96						
Herring, sea	2,200	17						
Hickory shad							500	20
King whiting or "kingfish"	15,900	603						
Mackerel	85,800	5,340						
Menhaden	36,000	180						
Mullet	4,800	277						
Pigfish	300	6						
Pike or pickerel							100	9
Scup	101,500	1,841						
Sea bass	39,900	3,036						
Shad	88,400	8,000	17,500	1,400			38,900	4,601
Spanish mackerel	14,600	736						
Spot	69,100	1,665						
Squeteagues or "sea trout":								
Gray	1,622,400	43,717						
Spotted	7,100	335						
Striped bass	18,900	1,754	300	30			8,500	823
Sturgeon	100	12						
Suckers			300	25				
White perch	4,300	90	3,000	120	100	5	3,900	194
Yellow perch			1,900	133			200	24
Crabs:								
Hard	4,116,400	76,215						
Soft and peelers	737,700	44,258						
Clams, hard, public	704,700	158,416						
Mussels, sea	77,400	2,257						
Oysters, market:								
Public, spring	216,200	16,167						
Public, fall	798,300	55,428						
Private, spring	883,000	93,083						
Private, fall	407,900	45,885						
Squid	54,400	1,088						
Terrapin, diamond back	300	135						
Total	13,233,500	607,682	74,700	3,385	600	32	147,000	9,160

Species	Chesterfield		Dinwiddie		Elizabeth City		Essex	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	1,000	$23	1,500	$18	268,300	$1,973		
Bluefish					57,500	1,852		
Bonito					1,200	91		
Butterfish					155,600	2,431		
Carp	8,100	325			100	3	2,900	$136
Catfish and bullheads	6,200	183					4,100	131
Cod					300	5		
Croaker					8,376,800	99,151	300	6
Drum:								
Black					200	4		
Red or redfish					12,800	202		
Eels:								
Common	100	6			200	1	1,300	76
Conger					900	11		
Flounders					155,100	9,368		
Gizzard shad					3,800	41	4,000	64
Hake					12,100	181		
Harvestfish					91,100	804		
Herring, sea					600	7		
Hickory shad	200	6			700	17		
Hogfish					100	3		
King whiting or "kingfish"					48,900	1,280		
Mackerel					1,800	131		
Menhaden					4,100	59		
Pigfish					100	1		

Fisheries of Virginia, 1936—Continued

CATCH: BY COUNTIES—Continued

Species	Chesterfield		Dinwiddie		Elizabeth City		Essex	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Pompano					100	$8		
Rudderfish					400	4		
Scup					471,600	5,625		
Sea bass					26,500	1,172		
Shad	300	$35			191,100	25,420	600	$106
Sharks					1,900	9		
Sheepshead					100	12		
Skates					1,200	3		
Spanish mackerel					2,000	180		
Spot					253,500	4,782		
Squeteagues or "sea trout", gray					1,610,100	31,267	200	8
Striped bass			200	$20	9,100	1,027	1,600	155
Sturgeon					5,400	450		
Swellfish					600	5		
Tautog					1,400	17		
White perch					19,500	279	3,700	171
Whiting					6,200	50		
Yellow perch							600	49
Crabs, hard					1,459,900	45,715	14,300	272
Clams:								
Hard, public					448,000	84,000		
Hard, private					176,000	33,000		
Oysters, market:								
Public, spring							12,400	1,423
Public, fall							9,300	1,069
Private, spring					495,200	55,905	107,900	12,330
Private, fall					803,700	94,174	84,000	9,603
Squid					5,800	147		
Turtles, hawksbill					500	5		
Total	15,900	578	1,700	38	15,182,100	500,872	247,200	25,599

Species	Fairfax		Gloucester		Henrico		Isle of Wight	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives			74,800	$377	900	$17	9,300	$273
Bluefish			15,900	476				
Butterfish			74,300	743				
Cabio or crab eater			1,800	90				
Carp	21,900	$1,023			8,000	240	6,100	183
Catfish and bullheads	56,300	1,689	5,100	153	5,000	150	12,100	324
Croaker			5,571,800	28,168			23,000	575
Eels, common	1,200	96	1,100	105				
Flounders			37,300	1,118				
Gizzard shad	30,300	303			4,000	60	5,100	131
Harvestfish			7,800	58				
Hickory shad			500	8				
King whiting or "kingfish"			1,500	15				
Mackerel			1,000	80				
Mullet			6,300	374			3,600	288
Pigfish			200	2				
Pike or pickerel	400	70						
Scup			2,500	25				
Shad	24,600	2,248	69,300	5,544	300	37	20,700	2,640
Sharks			200	4				
Spot			115,500	1,790				
Squeteagues or "sea trout":								
Gray			793,200	15,887			8,700	233
Spotted			1,800	144				
Striped bass	9,400	935	6,000	480			10,800	1,072
Sturgeon			200	22				
Suckers	600	18						
Tautog			100	1				
White perch	20,600	880	3,700	181				
Yellow perch	13,500	951					10,500	315
Crabs:								
Hard			1,037,200	21,713			522,000	15,225
Soft and peelers			4,800	1,020				
Clams, hard, public			831,300	62,704				
Oysters, market:								
Public, spring							64,300	5,715
Public, fall			500	60			129,700	11,529
Private, spring			109,100	9,252			191,300	16,924
Private, fall			132,700	11,560			65,000	5,679
Squid			100	2				
Total	178,800	8,213	8,907,600	162,156	18,200	504	1,082,200	61,106

Fisheries of Virginia, 1936—Continued

CATCH: BY COUNTIES—Continued

Species	James City		King and Queen		King George		King William	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	600	$3	700	$7	17,300	$197	1,000	$15
Butterfish	200	2						
Carp	8,800	285			8,500	353		
Catfish and bullheads	36,900	1,147	200	6	29,200	1,004		
Croaker	14,700	180	400	7				
Eels, common	900	81			8,300	498		
Gizzard shad	19,500	192			52,500	525		
Shad	27,600	3,092	4,000	551	13,900	1,167	1,200	129
Squeteagues or "sea trout," gray	500	25			800	24		
Striped bass	18,800	1,325	100	15	18,200	1,304	1,300	62
White perch	1,900	126			26,000	1,332		
Yellow perch	200	16	900	72	1,700	117		
Crabs:								
Hard					378,000	6,300	42,000	700
Soft and peelers					9,100	2,275		
Oysters, market:								
Public, spring	4,200	336						
Public, fall	4,200	336						
Private, spring							8,100	720
Private, fall							58,900	1,850
Turtle, snapper	1,700	51						
Total	140,700	7,197	6,300	658	563,500	15,096	112,500	3,476

Species	Lancaster		Mathews		Middlesex		Nansemond	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	1,664,500	$10,381	373,500	$2,491	4,100	$41		
Bluefish	9,100	455	40,900	1,093	11,000	513		
Butterfish	6,200	124	125,700	1,477			500	$40
Cabio or crab eater			6,500	312				
Carp	1,700	51			25,900	502		
Catfish and bullheads					6,200	166		
Croaker	645,000	6,383	4,436,200	42,987	330,700	4,244	12,000	360
Drum:								
Black			100	2				
Red or redfish			500	11				
Eels, common							800	80
Flounders	3,000	120	23,500	934	2,400	122	400	44
Gizzard shad	1,800	18	10,500	243			3,000	30
Harvestfish	8,100	162	7,000	80				
Hickory shad	2,700	54	200	2				
King whiting or "kingfish"			2,300	32				
Mackerel			3,800	254				
Menhaden	66,433,300	362,924	454,600	556	61,000	203		
Mullet			1,000	20			1,200	100
Scup			1,600	23				
Shad	100,600	9,960	461,900	55,675	1,000	80	1,200	229
Spot	700	14	214,900	3,342	111,300	2,123		
Squeteagues or "sea trout":								
Gray	420,800	4,491	1,184,200	14,024	6,900	196	5,200	413
Spotted	1,500	60	25,400	1,310	25,000	1,772		
Striped bass	34,100	2,202	6,900	449	38,300	667	5,500	660
Sturgeon			1,300	148				
White perch	5,200	208			3,700	81		
Yellow perch					3,500	105	11,600	1,160
Crabs:								
Hard	1,303,200	37,470	2,121,700	49,401	1,896,900	39,155	139,500	3,487
Soft and peelers	392,700	58,056	108,700	12,050	44,900	7,429		
Clams, hard, public			49,600	9,300				
Oysters, market:								
Public, spring	246,200	20,516	8,200	685	240,500	22,329	200	15
Public, fall	491,700	40,976	14,800	1,300	176,000	16,338		
Private, spring	506,800	42,859	200,900	16,732	261,200	24,255	281,900	24,498
Private, fall	304,700	25,805	31,400	2,619			114,900	9,173
Total	72,583,600	623,289	9,917,800	217,552	3,250,500	120,321	577,900	40,289

Fisheries of Virginia, 1936—Continued

CATCH: By counties—Continued

Species	New Kent		Norfolk		Northampton		Northumberland	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	26,000	$240	21,100	$192	49,800	$167	4,670,400	$42,473
Bluefish			3,500	98	64,100	1,989	5,100	194
Bonito			1,000	17	18,600	924		
Butterfish			120,100	1,505	721,500	19,806	9,100	224
Cabio or crab eater							600	24
Carp	100	4					5,200	154
Catfish and bullheads	13,500	405						
Cod					3,800	59		
Croaker			970,600	19,144	1,924,500	16,416	841,100	9,155
Drum, red or redfish			300	6	3,500	35	1,100	13
Eels:								
Common	900	48			37,100	5,565	11,000	446
Conger			100	1	700	7		
Flounders			38,600	2,246	9,600	529	13,300	420
Gizzard shad	2,000	20					9,900	50
Grayfish			500	19				
Hake			11,000	198				
Harvestfish			35,400	354	38,900	486		
Herring, sea			400	5	458,000	2,290		
Hickory shad			400	12			30,600	671
King whiting or "kingfish"			20,900	621	3,700	37		
Mackerel			3,500	331	28,500	1,439		
Menhaden					62,300	154	100,463,800	551,778
Mullet			2,200	132	60,300	3,210		
Pollock			100	2				
Scup			227,300	3,074	473,000	4,737		
Sea bass			8,300	438	3,500	175		
Sea robin			1,100	11				
Shad	9,300	784	19,800	2,367	24,800	3,199	392,000	37,093
Skates							1,000	10
Spanish mackerel			500	45	3,200	256	400	20
Spot			20,800	501	43,600	884	9,700	300
Squeteagues or "sea trout":								
Gray			234,900	5,928	3,762,500	56,205	143,700	3,520
Spotted			6,200	378	9,200	528	9,100	195
Striped bass			200	13	12,500	259	141,100	9,291
Sturgeon			1,100	106	500	45		
Swellfish					1,300	13		
Tautog			200	1				
Tuna or "horse mackerel"			100	1				
White perch	200	15	400	18	2,900	58	2,900	117
Whiting			10,300	183				
Wolffish			100	1				
Yellow perch	200	10						
Crabs:								
Hard	12,000	500	455,800	7,989	2,459,900	49,352	5,533,400	89,530
Soft and peelers					205,600	16,448	400,100	72,739
Clams, hard, public			11,500	3,240	280,900	31,623		
Oysters, market:								
Public, spring	200	17			301,900	25,158	32,000	2,000
Public, fall	300	18	2,300	150			56,000	3,500
Private, spring			1,732,800	115,520	603,800	50,316	112,500	12,693
Private, fall			1,732,800	115,521	342,500	28,860	123,800	13,440
Squid			2,600	55	51,600	2,580		
Total	64,700	2,061	5,698,800	280,423	12,068,100	323,809	113,018,900	850,050

Species	Prince George		Princess Anne		Prince William		Richmond	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	1,000	$10	41,800	$401	36,500	$273	26,100	$334
Bluefish			8,700	508				
Bonito			200	10				
Bowfin			6,500	195				
Butterfish			6,200	104				
Carp	69,000	1,936	235,500	6,008	19,900	1,024	17,300	628
Catfish and bullheads	47,100	1,418	1,000	20	45,800	1,666	32,600	911
Croaker			701,000	4,505			15,300	287
Drum, red or redfish			500	10				
Eels, common	900	38	25,000	1,500	16,300	911	5,800	349
Flounders			3,500	85			300	17
Gizzard shad	9,800	63	13,500	135	3,000	30	30,900	311
Hickory shad					1,700	39	1,100	46
King whiting or "kingfish"			1,000	30				
Pigfish			6,000	120				
Pike or pickerel					100	8		
Scup			500	15				
Shad	8,300	908	5,800	696	12,300	1,402	10,200	1,602

Fisheries of Virginia, 1936—Continued

CATCH: BY COUNTIES—Continued

Species	Prince George		Princess Anne		Prince William		Richmond	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Sheepshead			200	$8				
Spanish mackerel			400	32				
Spot			23,600	472			300	$10
Squeteagues or "sea trout":								
Gray			103,500	2,285			2,800	119
Spotted			15,500	930			700	13
Striped bass	300	$21	300	18	6,200	$540	12,700	1,163
Sturgeon					16,100	1,428		
Suckers			1,300	65				
White perch	500	20	14,500	580	19,300	623	11,600	650
Yellow perch	100	6					1,500	90
Crabs, hard			285,800	4,764	2,400	40	23,200	430
Clams, hard, public			1,000	270				
Oysters, market:								
Public, spring							12,500	1,423
Public, fall							9,400	1,070
Private, spring			5,500	440			107,900	12,331
Private, fall			16,500	1,320			84,000	9,603
Total	137,000	4,420	1,524,800	25,526	179,600	7,984	406,200	31,387

Species	Southampton		Stafford		Surry	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	160,000	$2,400			1,500	$15
Carp			13,500	$540	1,500	63
Catfish and bullheads			22,100	703	13,500	611
Croaker					200	8
Eels, common			3,100	155	200	14
Flounders					100	3
Gizzard shad			16,700	167	2,200	28
Pike or pickerel			100	13	100	10
Shad	1,800	180	12,800	1,280	5,200	488
Spot					100	5
Squeteagues or "sea trout," gray					600	30
Striped bass			60,300	6,030	2,900	271
White perch			8,100	356	800	52
Yellow perch			3,200	190		
Crabs, hard			33,800	5,200	700	92
Total	161,800	2,580	173,700	14,634	29,600	1,690

Species	Warwick		Westmoreland		York	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	36,200	$181	683,000	$5,320	17,300	$86
Bluefish	100	1	2,500	110	6,600	237
Butterfish	7,600	169			23,300	688
Cabio or crab eater					100	5
Carp			6,800	276	300	2
Catfish and bullheads			19,200	576	100	3
Cod					200	4
Croaker	756,100	17,139	11,000	165	1,875,800	29,532
Drum:						
Black					200	3
Red or redfish	300	3			1,400	41
Eels:						
Common			2,700	260		
Conger					400	4
Flounders	18,200	1,117	500	30	84,400	5,955
Gizzard shad			26,200	262		
Grayfish					300	2
Haddock					100	2
Hake	600	8			1,400	17
Harvestfish	79,200	448			600	6
Herring, sea					700	8
Hickory shad	300	1	8,700	189	400	13
King whiting or "kingfish"	11,000	462			25,500	849
Mullet					10,000	400
Scup	16,200	217			139,700	3,326
Sea bass	1,900	97			6,000	338
Shad	17,600	4,116	19,400	1,780	12,300	1,730
Sharks	500	15			8,900	316
Spot	2,400	25			44,000	775
Squeteagues or "sea trout":						
Gray	50,300	1,280	111,500	2,788	286,000	6,753
Spotted					10,900	645

Fisheries of Virginia, 1936—Continued

CATCH: BY COUNTIES—Continued

Species	Warwick		Westmoreland		York	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Striped bass	31,900	$217	58,200	$4,245	4,900	$339
Sturgeon	900	93			1,000	113
Swellfish					600	23
Tautog					200	3
Tomcod	200	3				
White perch	7,500	236	22,500	729	12,300	136
Whiting	2,000	27			1,700	23
Yellow perch			300	18		
Crabs:						
Hard	107,800	1,974	776,700	15,774	3,415,200	101,882
Soft and peelers			65,900	4,591		
Lobsters					200	15
Clams, hard, public	11,200	2,310			111,000	22,032
Oysters, market:						
Public, spring	48,800	2,934	248,200	15,513		
Public, fall	49,000	2,934	352,600	22,035		
Private, spring			24,600	1,540	523,000	51,351
Private, fall			48,900	3,055	216,700	17,310
Squid	200	8			7,300	163
Total	1,258,000	36,015	2,489,400	79,256	6,851,000	245,130

SEED OYSTER FISHERY: BY GEAR

Item	Tongs		Rakes		By hand		Total, exclusive of duplication	
OPERATING UNITS								
Fishermen:	*Number*		*Number*		*Number*		*Number*	
On vessels	46						46	
On boats and shore:								
Regular	945		188		54		1,187	
Casual	164						164	
Total	1,155		188		54		1,397	
Vessels, motor	16						16	
Net tonnage	87						87	
Boats:								
Motor	488						488	
Other	79		188				267	
Apparatus, number	1,029		188					
CATCH								
Oysters, seed:	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*
Public, spring	334,018	$59,578	10,575	$2,115	6,000	$1,200	350,593	$62,893
Public, fall	461,976	136,326	5,525	705	14,000	2,800	479,501	139,831
Private, spring			15,040	3,008			15,040	3,008
Total	795,994	195,904	29,140	5,828	20,000	4,000	845,134	205,732

SEED OYSTER FISHERY: BY COUNTIES

Item	Accomac		Elizabeth City		Gloucester		Isle of Wight	
OPERATING UNITS								
Fishermen:	*Number*		*Number*		*Number*		*Number*	
On vessels					30			
On boats and shore:								
Regular	94		17		264		291	
Casual							29	
Total	94		17		294		320	
Vessels, motor					10			
Net tonnage					55			
Boats:								
Motor	23		8		105		150	
Other					30		30	
Apparatus, tongs	38		17		284		320	
CATCH								
Oysters, seed:	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*
Public, spring	26,400	$4,872	4,250	$765	70,325	$12,966	113,698	$20,466
Public, fall	31,200	7,960	4,250	1,275	203,211	61,953	113,700	34,110
Total	57,600	12,832	8,500	2,040	273,536	74,919	227,398	54,576

Fisheries of Virginia, 1936—Continued

SEED OYSTER FISHERY: BY COUNTIES—Continued

Item	King and Queen		Mathews		Nansemond		New Kent	
OPERATING UNITS								
Fishermen:	*Number*		*Number*		*Number*		*Number*	
On vessels					3			
On boats and shore:								
Regular			22		58			
Casual	6		20		58		2	
Total	6		42		119		2	
Vessels, motor					1			
Net tonnage					6			
Boats:								
Motor			19		65		2	
Other	6							
Apparatus, tongs	6		38		97		2	
CATCH								
Oysters, seed:	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*
Public, spring	2,400	$360	28,100	$5,058	35,000	$6,325	500	$75
Public, fall			28,100	8,430	37,800	11,190	500	75
Total	2,400	360	56,200	13,488	72,800	17,515	1,000	150

Item	Norfolk		Northampton		Warwick		York	
OPERATING UNITS								
Fishermen:	*Number*		*Number*		*Number*		*Number*	
On vessels	3				10			
On boats and shore:								
Regular	13		193		100		135	
Casual			3		46			
Total	16		196		156		135	
Vessels, motor	1				4			
Net tonnage	5				21			
Boats:								
Motor			4		30		82	
Other	13		188					
Apparatus:								
Tongs	15		8		69		135	
Rakes			188					
CATCH								
Oysters, seed:	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*	*Bushels*	*Value*
Public, spring	7,815	$1,172	10,575	$2,115	18,530	$2,779	33,000	$5,940
Public, fall	1,685	253	7,525	1,905	18,530	2,780	33,000	9,900
Private, spring			15,040	3,008				
Total	9,500	1,425	33,140	7,028	37,060	5,559	66,000	15,840

NOTE.—Of the total number of persons fishing for seed oysters, 1,343 are duplicated among those fishing for market oysters or other species. Similarly, the following craft and gear are duplicated: 10 vessels, 480 motor boats, 248 other boats, 981 tongs, and 188 rakes.

SHAD AND ALEWIFE FISHERIES OF THE POTOMAC RIVER

The catch of shad in the Potomac River in 1936 amounted to 134,409 in number, 359,800 pounds in weight and their total value to the fishermen was $35,358. The catch of alewives for the same season amounted to 11,287,000 in number, with a total weight of 4,514,800 pounds, and a value to the fishermen of $36,674. These figures show a decrease of 43 percent in the weight and 37 percent in the value of shad as compared with 1935, and an increase of 1 percent in weight and 38 percent in the value of alewives.

Approximately 68 percent of the shad, in weight, were taken with pound nets, and 30 percent with gill nets. About 99 percent of

the alewives were taken with pound nets, the remainder being taken with gill nets and fyke nets.

Statistics of the catch of shad and alewives in the Potomac River are also included in the catch data for Maryland and Virginia which are published elsewhere in this report.

Shad and Alewife fisheries of the Potomac River, 1936

Item	Maryland			Virginia			Total		
Fishermen on boats and shore:	*Number*	*Pounds*	*Value*	*Number*	*Pounds*	*Value*	*Number*	*Pounds*	*Value*
Regular	25			223			248		
Casual	73			194			267		
Total	98			417			515		
Boats:									
Motor	36			92			128		
Other	16			110			126		
Apparatus:									
Haul seines	1			6			7		
Length, yards	100			840			940		
Gill nets	758			819			1,577		
Square yards	88,151			122,147			210,298		
Pound nets	43			250			293		
Fyke nets				100			100		
Shad caught:									
With haul seines	225	600	$60	1,824	4,900	$392	2,049	5,500	$452
With gill nets	10,550	28,300	2,824	29,436	78,500	7,119	39,986	106,800	9,943
With pound nets	6,725	19,100	2,395	85,424	227,800	22,491	92,149	246,900	24,886
With fyke nets				225	600	77	225	600	77
Total	17,500	48,000	5,279	116,909	311,800	30,079	134,409	359,800	35,358
Alewives caught:									
With gill nets				67,500	27,000	201	67,500	27,000	201
With pound nets	396,250	158,500	1,527	10,799,500	4,319,800	34,874	11,195,750	4,478,300	36,401
With fyke nets				23,750	9,500	72	23,750	9,500	72
Total	396,250	158,500	1,527	10,890,750	4,356,300	35,147	11,287,000	4,514,800	36,674

TRADE IN FISHERY PRODUCTS IN WASHINGTON, D. C.

The municipal fish wharf and market in Washington, D. C., is located in the southwestern part of the city on an arm of the Potomac River. At the present time 18 firms have stalls in this market, 2 are located in the immediate vicinity of the market, 3 have stalls in the Center Market, located at Fifth and K Streets NW., and 2 are located in other parts of the city. Altogether there are 25 firms which employ 131 persons who received $145,621 in salaries and wages during 1936. Of the total employees 90 were regularly employed. These firms conduct mainly a wholesale business although some retail trade is carried on.

The facilities for handling fish and oysters from boats and vessels that may land at the wharf are good, but only a comparatively small quantity are brought into the city by this method. In the fall and winter, considerable quantities of shell oysters are landed, but most of the oysters handled in Washington are brought in already shucked from Maryland and Virginia, by trucks and other transportation facilities.

During the year 1936 the receipts of fresh and frozen fishery products as received at the municipal fish wharf amounted to 9,395,945 pounds. This is a decrease of 23 percent as compared with 1935, and a decrease of 10 percent as compared with the 5-year average.

During 1936 two firms in Washington, D. C., smoked fishery products and one firm produced shucked oysters. The total value of the products produced by these firms amounted to $22,424.

Fishery products received at municipal fish wharf and market, Washington, D. C., 1936 [1]

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Alewives (river herring)	31,250	14,200	125,500	214,900	106,500	3,600							495,950
Bluefish	15,500	16,200	11,400	9,500	8,600	10,500	8,000	10,400	20,100	25,800	24,400	27,800	188,200
Butterfish	6,000	3,600	6,100	14,200	18,100	51,000	42,700	39,600	12,600	9,000	16,200	8,400	227,500
Carp	12,850	3,800	37,600	19,300	20,600	11,000	5,200	7,100	16,000	18,250	11,750	15,100	178,550
Catfish	1,800	200	28,500	18,700	14,300	11,900	4,300	5,300	12,600	23,720	28,650	20,500	170,470
Cod	1,500	1,700	1,300	8,300	4,300	2,000	1,100		100	1,000	4,000	800	26,100
Croaker	137,800	92,600	246,300	465,100	391,500	224,000	210,800	133,700	193,100	134,200	102,000	102,200	2,433,300
Drum, red or redfish	2,400	600	300	900	300	800					600		5,900
Eels	500		1,300	1,100	900	200	100	100	900	3,495	2,975	1,225	12,795
Flounders	41,810	32,100	62,800	18,100	19,600	15,600	11,000	10,800	5,275	10,575	25,900	22,755	276,315
Gizzard shad	29,450	600	5,000	2,500	200				2,000	18,800	27,150	9,600	95,300
Haddock	25,370	31,650	39,955	39,235	34,420	16,555	17,700	9,180	17,300	38,470	25,200	25,750	320,785
Hake	900		100	1,300							7,200	400	9,900
Halibut	5,900	8,100	7,700	5,500	6,600	1,900	2,500	2,400	1,602	15,200	11,600	13,200	82,202
Hickory shad or "jacks"	1,200	400	2,300	2,500	400								6,800
Kingfish or "king mackerel"	4,600	3,600	1,000	3,900	200			300		600	1,200		15,400
Mackerel	32,100	26,800	24,800	26,000	21,700	21,200	18,800	8,600	9,002	20,650	32,400	37,200	279,252
Menhaden						3,000	5,000	200					8,200
Mullet	13,700	12,100	3,300						5,300	26,600	3,600	13,900	78,500
Perch	10,800	1,000	63,900	24,300	7,400	400	500	200	5,800	10,250	20,020	17,410	161,980
Pike or pickerel	400	400	1,200	200					400	1,700	1,050	2,100	7,450
Pollock	3,700	19,900	15,400							3,550	10,475	14,425	67,450
Pompano									100				100
Salmon	5,000	4,400	6,500	1,600	1,000	1,400	2,900	2,400	2,100	9,500	8,900	9,600	55,300
Scup or porgy	34,000	49,500	37,440	27,800	19,700	10,500	20,900	2,400	2,200	10,400		21,200	236,040
Sea bass	45,700	16,500	17,500	8,100	2,400	17,200	1,400	1,500	200	3,000	4,800	5,600	123,900
Shad	9,400	4,200	28,600	110,300	98,800	2,600							253,900
Sharks							100						100
Smelt	3,300	4,535	3,750	1,430	420					150	4,165	4,025	21,775
Snapper, red	1,600	1,500	1,000	100	400	500	300	300	500	550	1,000	1,300	9,050
Spot					1,200	3,400	17,000	13,800	32,600	143,800	9,400		221,200
Squeteagues or "sea trout"	84,900	25,900	30,100	17,200	192,200	157,600	111,100	126,500	178,600	120,200	103,000	64,000	1,211,300
Striped bass	24,100	3,600	29,400	35,200	30,630	6,500	2,700	7,500	21,100	61,800	80,400	49,450	352,380
Sturgeon	75				117	100							292
Swordfish	850	6,950	7,757	2,540	814	390	350	710	605	2,110	3,180	2,060	28,316
Tilefish	400		400	200	100							200	1,300
Whitefish	200	400	100	200	100	200	100			100		150	1,550
Whiting	900	2,400	400	100							26,200	61,200	91,200

[1] These statistics are reported to the Bureau by agents of the Health Department, District of Columbia.

Fishery products received at municipal fish wharf and market, Washington, D. C., 1936—Continued

Species	January	February	March	April	May	June	July	August	September	October	November	December	Total
Crabs:	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Hard					800	10,100	15,900	31,200	18,400	2,200			78,600
Soft				2,025	5,355	9,225	6,615	4,095	2,475	135			29,925
Meat	5,270	4,490	8,305	8,485	13,720	17,585	18,760	13,170	12,245	21,250	12,650	12,900	148,830
Sea crawfish or spiny lobster:													
Alive								50					50
Meat	250	30		50		85	25	50	155				645
Lobsters:													
Alive	452	503	500	231	930	680	225	225	975	2,585	3,000	2,450	12,756
Meat	175	167	592	560	100	93		75	250	725			2,737
Shrimp:													
Green	12,125	23,312	14,125	14,250	25,125	48,250	27,875	14,375	15,625	46,875	33,000	26,125	301,062
Cooked	4,785	3,700	6,250	2,890	3,215	2,710	2,005	975	3,075	17,375	13,525	11,500	72,005
Squid	1,400	100	100	400			400	300				2,400	5,100
Clams, hard	3,584	4,384	4,256	7,136	4,576	3,392	3,072	1,888	4,320	7,296	6,304	5,632	[2] 55,840
Oysters:													
In the shell (meat)	22,799	6,258	17,885	6,447					7,840	74,340	91,091	69,965	[3] 296,625
Opened (meat)	87,360	48,659	43,094	17,019					15,391	123,795	109,288	142,188	[4] 586,794
Scallops	4,840	2,008	832	1,192	1,520	1,952	1,288	1,040	3,280	12,560	10,440	6,640	[5] 47,592
Frogs	15	12	142	119	169	30	30	90					607
Terrapin	100	70											170
Turtles				300	285		20						605
Total	733,110	483,128	944,783	1,141,409	1,059,296	668,147	560,765	450,523	624,115	1,022,606	876,713	831,350	9,395,945

[2] 6,980 bushels. [3] 42,375 bushels. [4] 67,062 gallons. [5] 5,949 gallons.

NOTE.—Hard clams have been converted to pounds on the basis of 8 pounds of meats to the bushel, oysters on the basis of 7 pounds of meats to the bushel, and 8¾ pounds to the gallon, and scallops on the basis of 8 pounds of meats to the gallon.

FISHERIES OF THE SOUTH ATLANTIC AND GULF STATES

(South Atlantic, Area XXIV; Gulf, Area XXV)[8]

The yield of the commercial fisheries of the marine areas of the South Atlantic and Gulf States (North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas) during 1936 amounted to 556,992,700 pounds, valued at $13,542,301 to the fishermen, representing an increase of 24 percent in volume and 36 percent in value as compared with the catch in 1934, the most recent year for which catch statistics are available. These fisheries gave employment to 29,006 fishermen as compared with 24,898 in 1934.

There were 703 fishery wholesale and manufacturing establishments in these States in 1936, as compared with 591 in 1934, when the most recent previous survey of these establishments was made. In 1936 these establishments employed 17,095 persons, paid $3,296,241 in salaries and wages and produced manufactured products (canned, cured, packaged, and byproducts), valued at $11,445,674. In 1934, the wholesale and manufacturing firms employed 14,354 persons, paid $2,873,812 in salaries and wages and produced manufactured products valued at $9,906,595.

Fisheries of the South Atlantic and Gulf States, 1936

SUMMARY OF CATCH

Product	North Carolina		South Carolina		Georgia	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Fish	206,022,600	$2,171,067	2,612,000	$123,334	15,105,500	$120,163
Shellfish, etc	13,856,000	563,702	5,876,300	220,147	12,246,800	348,616
Total	219,878,600	2,734,769	8,488,300	343,481	27,352,300	468,779

Product	Florida		Alabama		Mississippi	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Fish	146,397,600	$3,265,786	5,391,300	$214,404	1,317,500	$61,701
Shellfish, etc	27,205,300	1,972,620	3,861,500	141,055	25,277,700	864,444
Total	173,602,900	5,238,406	9,252,800	355,459	26,595,200	926,145

Product	Louisiana		Texas		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Fish	2,275,100	$125,256	6,322,600	$362,385	385,444,200	$6,444,096
Shellfish, etc	72,119,700	2,572,743	11,105,200	414,878	171,548,500	7,098,205
Total	74,394,800	2,697,999	17,427,800	777,263	556,992,700	13,542,301

[8] These are the numbers given to these areas by the North American Council on Fishery Investigations. The catch in the Mississippi River and tributaries is not included in this section. For a clearer understanding of the statistics published in this section, the reader is referred to the section in the latter part of this document entitled "Statistical survey procedure."

Fisheries of the South Atlantic and Gulf States, 1936—Continued

OPERATING UNITS: By States

Item	North Carolina	South Carolina	Georgia	Florida	Alabama	Mississippi	Louisiana	Texas	Total
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:									
On vessels	1,175	36	164	1,211	132	686	403	130	3,937
On boats and shore:									
Regular	3,845	753	712	5,636	644	1,209	4,480	1,103	18,382
Casual	1,882	806	456	2,022	102	201	932	286	6,687
Total	6,902	1,595	1,332	8,869	878	2,096	5,815	1,519	29,006
Vessels:									
Motor	180	10	55	259	38	195	173	41	951
Net tonnage	2,191	130	508	4,238	414	2,397	1,279	428	11,585
Sail	67	-------	-------	-------	-------	12	-------	-------	79
Net tonnage	613	-------	-------	-------	-------	164	-------	-------	777
Total vessels	247	10	55	259	38	207	173	41	1,030
Total net tonnage	2,804	130	508	4,238	414	2,561	1,279	428	12,362
Boats:									
Motor	1,362	55	137	2,283	268	483	1,970	501	7,059
Other	2,516	820	576	3,538	281	503	1,572	245	10,051
Accessory boats	120	-------	4	22	-------	-------	24	-------	170
Apparatus:									
Purse seines:									
Menhaden	32	-------	2	10	-------	-------	-------	-------	44
Length, yards	8,900	-------	600	2,960	-------	-------	-------	-------	12,460
Other	4	-------	-------	-------	-------	-------	-------	-------	4
Length, yards	800	-------	-------	-------	-------	-------	-------	-------	800
Haul seines:									
Common	603	46	11	296	6	9	107	8	1,086
Length, yards	109,321	7,325	1,132	157,225	4,500	2,350	18,510	850	301,213
Long	72	-------	-------	-------	-------	-------	-------	-------	72
Length, yards	83,200	-------	-------	-------	-------	-------	-------	-------	83,200
Gill nets:									
Anchor	2,369	247	25	20	-------	-------	-------	-------	2,661
Square yards	1,272,930	161,760	1,875	34,450	-------	-------	-------	-------	1,471,015
Drift	219	93	160	102	-------	-------	-------	-------	574
Square yards	153,440	77,800	99,150	144,600	-------	-------	-------	-------	474,990
Runaround	813	67	35	2,077	7	-------	1	89	3,089
Square yards	477,175	35,200	16,000	1,917,305	5,400	-------	550	25,350	2,476,980
Stake	7,143	20	258	7	8	-------	-------	287	7,723
Square yards	494,555	18,700	26,650	5,300	2,000	-------	-------	81,300	628,505
Trammel nets	-------	-------	-------	434	131	44	46	98	753
Square yards	-------	-------	-------	294,600	45,200	8,650	9,355	53,990	411,795
Lines:									
Hand	70	204	348	2,606	103	173	282	259	4,045
Hooks and baits	140	319	348	3,098	169	199	287	259	4,819
Trawl	-------	-------	-------	2	-------	-------	-------	-------	2
Hooks	-------	-------	-------	180	-------	-------	-------	-------	180
Troll	-------	-------	-------	1,207	-------	-------	-------	6	1,213
Hooks	-------	-------	-------	1,337	-------	-------	-------	6	1,343
Trot with baits or snoods	831	194	181	228	95	172	921	38	2,660
Baits or snoods	648,000	97,800	87,000	98,200	32,950	68,037	218,825	11,700	1,262,512
Trot with hooks	24	-------	2	334	84	-------	-------	124	568
Hooks	3,300	-------	325	105,725	25,500	-------	-------	64,200	199,050
Pound nets	2,434	-------	-------	23	-------	-------	-------	-------	2,457
Wheels	13	-------	-------	-------	-------	-------	-------	-------	13
Fyke nets	670	-------	-------	10	12	-------	-------	-------	692
Dip nets:									
Common	425	-------	-------	113	-------	-------	51	23	612
Drop	-------	-------	-------	303	-------	75	8,694	-------	9,072
Cast nets	-------	28	-------	139	-------	81	67	-------	315
Otter trawls:									
Fish	6	-------	-------	-------	-------	-------	-------	-------	6
Yards at mouth	140	-------	-------	-------	-------	-------	-------	-------	140
Shrimp	214	28	177	325	157	563	1,828	351	3,643
Yards at mouth	3,866	596	3,860	6,590	1,898	7,228	22,533	5,639	52,210
Traps:									
Box	6	-------	-------	300	-------	-------	-------	-------	306
Brush	-------	-------	-------	-------	-------	-------	25,500	-------	25,500
Turtle	510	-------	-------	-------	-------	-------	-------	-------	510
Pots:									
Crab	-------	-------	436	4,821	-------	-------	-------	68	5,325
Eel	2,132	-------	-------	73	-------	-------	-------	-------	2,205
Fish	46	53	55	3,490	65	-------	-------	-------	3,709
Sea crawfish	-------	-------	-------	1,140	-------	-------	-------	-------	1,140
Spears	456	122	-------	122	49	68	-------	181	998

Fisheries of the South Atlantic and Gulf States, 1936—Continued

OPERATING UNITS: By states—Continued

Item	North Carolina	South Carolina	Georgia	Florida	Alabama	Mississippi	Louisiana	Texas	Total
Apparatus—Continued	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Dredges:									
Clam				1					1
Crab	20								20
Yards at mouth	20								20
Oyster	277	3		3	13	290	76	62	724
Yards at mouth	293	5		3	13	290	76	68	748
Scallop				74					74
Yards at mouth				82					82
Tongs, oyster	219	18	7	324	227	472	744	168	2,179
Rakes:									
Oyster	2			1					3
Other	1,119								1,119
Forks				11					11
Grabs		152	17	3					172
Coquina scoops				6					6
Hooks:									
Conch				2					2
Sponge				254					254
Stone crab	2								2
Diving outfits				59					59

CATCH: By States

Species	North Carolina		South Carolina		Georgia	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	11,928,600	$129,675				
Bluefish	2,027,800	109,618	9,600	$885		
Bowfin	6,800	68				
Butterfish	358,400	5,528				
Carp	510,800	14,108				
Catfish and bullheads	470,800	9,446	121,200	4,381	37,200	$1,680
Croaker	9,743,100	104,726			5,000	200
Drum:						
Black			42,000	1,180	10,000	400
Red or redfish	251,100	7,403	104,400	5,604	50,000	2,550
Eels, common	64,000	3,426				
Flounders	1,175,200	66,920	64,500	5,150	8,500	475
Gizzard shad	42,500	425				
Grunts			8,000	500		
Harvest or "starfish"	893,100	11,300				
Hickory shad	221,000	6,604	800	10	20,900	418
King whiting or "kingfish"	1,216,000	31,493	117,000	5,750	75,500	1,340
Mackerel	1,000	10				
Menhaden	150,088,400	599,145			14,500,000	58,000
Mullet	6,470,900	222,291	747,300	30,519	17,000	850
Permit			8,000	400		
Pigfish	29,700	297				
Pike or pickerel	1,100	45				
Pinfish or sailors choice	30,000	50				
Pompano	17,200	2,045				
Sea bass	107,000	4,280	162,900	11,020		
Sea catfish			150,000	4,000		
Shad	1,095,300	176,627	177,100	28,076	236,000	42,212
Sharks	1,100	22	75,000	750		
Sheepshead, salt water	20,700	920	2,000	100	10,000	400
Spadefish	4,900	98				
Spanish mackerel	433,400	21,614				
Spot	7,443,200	166,683	662,700	13,739	10,000	400
Squeteagues or "sea trout":						
Gray	8,969,100	314,192	3,000	210		
Spotted	1,399,200	88,469	98,000	7,010	115,000	10,700
Striped bass	767,800	61,257				
Sturgeon	4,700	446	58,500	4,050	10,400	538
Suckers	6,500	277				
White perch	193,300	10,217				
Yellow perch	23,600	1,230				
Yellowtail	5,300	112				
Total	206,022,600	2,171,067	2,612,000	123,334	15,105,500	120,163

Fisheries of the South Atlantic and Gulf States, 1936—Continued

CATCH: BY STATES—Continued

Species	North Carolina		South Carolina		Georgia	
SHELLFISH, ETC.	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs:						
Hard [1]	6,375,000	$132,316	1,626,400	$17,987	2,182,200	$33,033
Soft and peelers	215,900	60,486	9,200	550		
Stone	800	100				
Shrimp	3,815,000	119,541	1,100,800	37,024	9,714,800	291,402
Clams, hard, public [2]	839,500	75,326	20,200	1,780		
Oysters, market: [3]						
Public, spring	883,700	51,840	2,500	243		
Public, fall	1,538,800	102,141	6,700	576		
Private, spring	19,800	2,300	2,152,400	112,538	208,200	13,326
Private, fall	38,200	4,350	956,300	49,259	121,900	7,740
Scallops, bay	99,200	14,175				
Terrapin, diamond back			1,800	190	19,700	3,115
Turtles, snapper	30,100	1,127				
Total	13,856,000	563,702	5,876,300	220,147	12,246,800	348,616
Grand total	219,878,600	2,734,769	8,488,300	343,481	27,352,300	468,779

Species	Florida		Alabama		Mississippi	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	231,500	$1,158				
Amberjack	13,400	365				
Angelfish	1,500	45				
Bluefish	3,784,400	194,456	72,000	$3,378		
Blue runner or hardtail	598,500	7,577	16,700	490		
Buffalofish			43,700	1,748		
Cabio or crab eater	5,900	143				
Catfish and bullheads	4,348,000	148,286	101,500	6,090		
Cigarfish	11,000	255				
Crappie	463,000	15,758				
Crevalle	183,200	3,304				
Croaker	40,000	844	17,500	350	11,500	$345
Dolphin	5,000	100				
Drum:						
Black	196,800	4,622	1,900	47	8,300	249
Red or redfish	1,160,200	38,012	33,800	2,284	87,600	4,355
Eels, common	19,400	582				
Flounders	354,300	16,599	36,900	2,882	30,900	2,462
Groupers	4,862,200	142,793	196,400	6,728	150,000	4,500
Grunts	58,700	1,527				
Hickory shad	42,000	920				
Hogfish	13,000	390				
Jewfish	38,800	1,075				
Kingfish or "king mackerel"	3,944,100	161,491				
King whiting or "kingfish"	1,856,500	32,439	1,000	30	5,100	153
Menhaden	68,874,800	269,368				
Mojarra	352,100	8,169				
Moonfish	2,500	75				
Mullet	31,361,700	978,282	3,586,000	111,438	354,500	10,635
Muttonfish	165,500	11,530				
Paddlefish or spoonbill cat			13,700	822		
Permit	16,100	320				
Pigfish	71,200	1,474				
Pinfish or sailors choice	33,100	592				
Pompano	713,700	149,313	6,600	1,320	800	120
Porgies	36,800	964				
Sea bass	77,400	3,744				
Sea catfish	97,700	1,954	8,000	264	26,100	522
Shad	282,500	26,798				
Sharks	1,037,000	3,270				
Sheepshead:						
Fresh water			1,400	84		
Salt water	914,700	22,488	24,300	1,039	24,400	982
Snapper:						
Mangrove	243,200	9,784				
Red	4,944,300	308,491	1,027,500	61,650	324,900	19,494
Snook or sergeantfish	605,300	23,498				
Spadefish	19,700	705				
Spanish mackerel	8,935,700	363,868	72,900	4,725		
Spot	208,500	4,335	800	16		
Squeteagues or "sea trout":						
Spotted	4,182,100	269,833	105,800	8,314	179,600	14,268
White	89,100	3,803	12,300	369	113,600	3,608
Sturgeon	29,500	3,550	1,600	112		
Sunfish	677,400	18,911				
Swellfish	800	40				

See footnotes at end of table.

Fisheries of the South Atlantic and Gulf States, 1936—Continued

CATCH: BY STATES—Continued

Species	Florida		Alabama		Mississippi	
FISH—continued	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Tenpounder	46,900	$1,070	9,000	$224		
Tripletail	37,300	560			200	$8
Yellowtail	109,600	6,256				
Total	146,397,600	3,265,786	5,391,300	214,404	1,317,500	61,701
SHELLFISH, ETC.						
Crabs:						
Hard [1]	3,149,000	49,636	997,200	14,352	2,011,000	30,476
Soft and peelers			600	200	2,700	518
Stone	44,800	8,770				
Sea crawfish or spiny lobster	326,600	20,090				
Shrimp	20,724,900	628,443	1,868,700	65,296	17,493,100	471,589
Clams:						
Coquina	4,300	720				
Hard, public [2]	634,200	41,180				
Conchs	7,800	624				
Oysters, market: [3]						
Public, spring	609,700	34,303	690,100	36,802	5,536,800	340,940
Public, fall	462,300	33,688	270,900	21,335	234,100	20,921
Private, spring	165,600	8,626	10,500	875		
Private, fall	135,500	5,151	20,300	1,875		
Scallops, bay	332,100	32,523				
Terrapin, diamond back			3,200	320		
Turtles:						
Green	18,700	2,175				
Soft shell	99,900	1,646				
Sponges:						
Grass	22,800	18,401				
Sheepswool	361,600	999,775				
Wire	8,400	6,582				
Yellow	97,100	80,287				
Total	27,205,300	1,972,620	3,861,500	141,055	25,277,700	864,444
Grand total	173,602,900	5,238,406	9,252,800	355,459	26,595,200	926,145

Species	Louisiana		Texas		Total	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives					12,160,100	$130,833
Amberjack					13,400	365
Angelfish					1,500	45
Bluefish					5,893,800	308,337
Blue runner or hardtail					615,200	8,067
Bowfin					6,800	68
Buffalofish			200	$8	43,900	1,756
Butterfish					358,400	5,528
Cabio or crab eater					5,900	143
Carp					510,800	14,108
Catfish and bullheads			53,200	5,132	5,131,900	175,015
Cigarfish					11,000	255
Crappie					463,000	15,758
Crevalle					183,200	3,304
Croaker	407,500	$11,702	52,400	1,518	10,277,000	119,685
Dolphin					5,000	100
Drum:						
Black	150,100	5,278	2,256,500	55,840	2,665,600	67,616
Red or redfish	346,900	19,211	955,600	69,067	2,989,600	148,486
Eels, common					83,400	4,008
Flounders	21,700	1,522	103,500	10,218	1,795,500	106,228
Gizzard shad					42,500	425
Groupers	4,000	160	34,100	1,507	5,246,700	155,688
Grunts					66,700	2,027
Harvest or "starfish"					893,100	11,300
Hickory shad					284,700	7,952
Hogfish					13,000	390
Jewfish	21,000	945	2,900	107	62,700	2,127
Kingfish or "king mackerel"			2,800	112	3,946,900	161,603
King whiting or "kingfish"	2,000	60	15,100	455	3,288,200	71,720
Mackerel					1,000	10
Menhaden					233,463,200	926,513
Mojarra					352,100	8,169
Moonfish					2,500	75
Mullet	5,400	107			42,542,800	1,354,122
Muttonfish					165,500	11,530
Paddlefish or spoonbill cat					13,700	822
Permit					24,100	720

See footnotes at end of table.

Fisheries of the South Atlantic and Gulf States, 1936—Continued

CATCH: BY STATES—Continued

Species	Louisiana		Texas		Total	
FISH—continued	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Pigfish					100,900	$1,771
Pike or pickerel					1,100	45
Pinfish or sailors choice					63,100	642
Pompano			100	$15	738,400	152,813
Porgies					36,800	964
Sea bass					347,300	19,044
Sea catfish	4,700	$141	3,100	143	289,600	7,024
Shad					1,790,900	273,713
Sharks					1,113,100	4,042
Sheepshead:						
Fresh water					1,400	84
Salt water	155,200	5,857	66,000	1,901	1,217,300	33,687
Snapper:						
Mangrove					243,200	9,784
Red	117,000	9,780	906,600	58,436	7,320,300	457,851
Snook or sergeantfish			7,000	560	612,300	24,058
Spadefish					24,600	803
Spanish mackerel			16,700	985	9,458,700	391,192
Spot	2,300	46	10,600	212	8,338,100	185,431
Squeteagues or "sea trout":						
Gray					8,972,100	314,402
Spotted	765,000	60,608	1,836,200	156,169	8,680,900	615,371
White	271,600	9,818			486,600	17,598
Striped bass					767,800	61,257
Sturgeon					104,700	8,696
Suckers					6,500	277
Sunfish					677,400	18,911
Swellfish					800	40
Tenpounder					55,900	1,294
Tripletail	700	21			38,200	589
White perch					193,300	10,217
Yellow perch					23,600	1,230
Yellowtail					114,900	6,368
Total	2,275,100	125,256	6,322,600	362,385	385,444,200	6,444,096
SHELLFISH, ETC.						
Crabs:						
Hard [1]	12,576,400	167,765	319,600	8,165	29,236,800	453,730
Soft and peelers	365,300	53,031			593,700	114,785
Stone					45,600	8,870
Sea crawfish or spiny lobster					326,600	20,090
Shrimp	53,429,800	1,836,168	9,962,500	328,603	118,109,600	3,778,066
Clams:						
Coquina					4,300	720
Hard, public [2]					1,493,900	118,286
Conchs					7,800	624
Oysters, market: [3]						
Public, spring	414,000	23,609	474,500	44,960	8,611,300	532,697
Public, fall	128,000	11,088	311,700	30,265	2,952,500	220,014
Private, spring	2,956,400	251,321	24,600	1,923	5,537,500	390,909
Private, fall	2,244,400	228,711	12,300	962	3,528,900	298,048
Scallops, bay					431,300	46,698
Terrapin, diamond back	5,400	1,050			30,100	4,675
Turtles:						
Green					18,700	2,175
Snapper					30,100	1,127
Soft shell					99,900	1,646
Sponges:						
Grass					22,800	18,401
Sheepswool					361,600	999,775
Wire					8,400	6,582
Yellow					97,100	80,287
Total	72,119,700	2,572,743	11,105,200	414,878	171,548,500	7,098,205
Grand total	74,394,800	2,697,999	17,427,800	777,263	556,992,700	13,542,301

[1] Statistics on hard crabs used in this table are based on yields of 6 pounds per dozen in North Carolina, South Carolina, and Georgia; 5.96 pounds in Florida; 5.81 pounds in Alabama; 5.50 pounds in Mississippi; 5.59 pounds in Louisiana; and 5.21 pounds in Texas.

[2] Statistics on hard clams used in this table are based on yields of 8 pounds of meats per bushel in all States.

[3] Statistics on market oysters used in this table are based on yields of 4.96 pounds of meats per bushel in North Carolina; 4.64, in South Carolina; 6.01, in Georgia; 4.18, in Florida; 4.11, in Alabama; 3.59, in Mississippi; 3.77, in Louisiana; and 4.92, in Texas.

NOTE.—The catch for Mississippi includes the following products taken by Mississippi craft in Louisiana waters: Shrimp, 15,748,300 pounds, valued at $423,899; oysters, market, spring, 4,009,200 pounds of meats, valued at $244,879; oysters, market, fall, 56,700 pounds, valued at $3,884. The seed oyster fishery was prosecuted in this section only in North Carolina where 55 regular and 45 casual fishermen using 37 motor boats and 37 dredges took 55,500 bushels of seed oysters, valued at $11,100, from public beds. Of these regular fishermen 38 are duplicated among those fishing for market oysters or other species. Similarly 14 motor boats are duplicated.

Fisheries of the South Atlantic and Gulf States, 1936—Continued

SUPPLEMENTARY TABLE SHOWING THE PRODUCTION OF CERTAIN SHELLFISH IN NUMBER AND BUSHELS

Product	North Carolina		South Carolina		Georgia	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Crabs:						
Hard—number	12,750,000	$132,316	3,252,800	$17,987	4,364,400	$33,033
Soft and peelers—do	647,700	60,486	27,600	550		
Clams, hard, public—bushels	104,938	75,326	2,525	1,780		
Oysters, market:						
Public, spring—do	178,165	51,840	539	243		
Public, fall—do	310,242	102,141	1,444	576		
Private, spring—do	3,992	2,300	463,879	112,538	34,642	13,326
Private, fall—do	7,702	4,350	206,099	49,259	20,283	7,740
Scallops, bay—do	16,533	14,175				

Product	Florida		Alabama		Mississippi	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Crabs:						
Hard—number	6,340,152	$49,636	2,058,600	$14,352	4,384,582	$30,476
Soft and peelers—do			1,800	200	8,100	518
Clams, hard, public—bushels	79,275	41,180				
Oysters, market:						
Public, spring—do	145,861	34,303	167,908	36,802	1,542,284	340,940
Public, fall—do	110,598	33,688	65,912	21,335	65,209	20,921
Private, spring—do	39,617	8,626	2,555	875		
Private, fall—do	32,416	5,151	4,939	1,875		
Scallops, bay—do	66,420	32,523				

Product	Louisiana		Texas		Total	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Crabs:						
Hard—number	27,015,848	$167,765	736,058	$8,165	60,902,440	$453,730
Soft and peelers—do	1,057,901	53,031			1,743,101	114,785
Clams, hard, public—bushels					186,738	118,286
Oysters, market:						
Public, spring—do	109,814	23,609	96,443	44,960	2,241,014	532,697
Public, fall—do	33,952	11,088	63,354	30,265	650,711	220,014
Private, spring—do	784,191	251,321	5,000	1,923	1,333,876	390,909
Private, fall—do	595,332	228,711	2,500	962	869,271	298,048
Scallops, bay—do					82,953	46,698

Industries related to the fisheries of the South Atlantic and Gulf States, 1936

OPERATING UNITS, SALARIES, AND WAGES

Item	North Carolina	South Carolina	Georgia	Florida	Alabama	Mississippi	Louisiana	Texas	Total
Transporting:									
Persons engaged:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	79	120	19	46	8		67		339
On boats	59	7	25	86			118		295
Total	138	127	44	132	8		185		634
Vessels:									
Motor	59	13	6	26	4		33		141
Net tonnage	496	208	51	303	45		263		1,366
Sail		34							34
Net tonnage		332							332
Total vessels	59	47	6	26	4		33		175
Total net tonnage	496	540	51	303	45		263		1,698
Boats	54	7	23	86			61		231
Wholesale and manufacturing:									
Establishments	140	25	26	291	22	38	116	45	703
Persons engaged:									
Proprietors	163	21	21	318	17	23	109	50	722
Salaried employees	55	19	32	191	21	66	135	38	557

See footnotes at end of table.

Industries related to the fisheries of the South Atlantic and Gulf States, 1936—Con.

OPERATING UNITS, SALARIES, AND WAGES—Continued

Item	North Carolina	South Carolina	Georgia	Florida	Alabama	Mississippi	Louisiana	Texas	Total
Wholesale and manufacturing—Continued.									
Persons engaged—Con.									
Wage earners:									
Average for season	*Number* 1,879	*Number* 858	*Number* 1,508	*Number* 2,375	*Number* 442	*Number* 2,205	*Number* 4,982	*Number* 1,567	*Numbe* 15,816
Average for year	494	252	418	1,051	161	778	1,257	290	4,701
Paid to salaried employees	$67,376	$39,825	$49,954	$286,872	$19,600	$82,276	$198,454	$46,068	$790,425
Paid to wage earners	$237,302	$108,862	$185,852	$651,930	$86,393	$348,079	$715,017	$172,381	$2,505,816
Total salaries and wages	$304,678	$148,687	$235,806	$938,802	$105,993	$430,355	$913,471	$218,449	$3,296,241
Fishermen manufacturing	806	15	45	244	130	28	9	39	1,316

PRODUCTS MANUFACTURED

Item	North Carolina		South Carolina		Georgia		Florida	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
By manufacturing establishments:								
Alewives:								
Corned—pounds	6,055,000	$53,311						
Smoked—do	22,400	3,005						
Roe, canned standard cases	8,762	58,628						
Groupers:								
Fresh fillets—pounds							32,900	$5,410
Fresh steaks—do							359,804	56,120
Menhaden:								
Acid scrap—tons	8,961	138,746			(1)	(1)	4,931	77,802
Dry scrap—do	3,438	108,938					8,180	240,069
Meal—do	2,366	82,223					(1)	(1)
Oil—gallons	666,454	184,202			(1)	(1)	250,824	61,273
Mullet:								
Salted—pounds	411,800	28,375					573,200	29,310
Roe, salted—do							18,550	4,318
Spanish mackerel, salted—do							97,000	4,920
Spot, salted—do	66,000	4,355						
Crab meat, packaged, fresh cooked—pounds	431,713	162,117	(1)	(1)	285,150	$94,140	309,268	99,748
Shrimp:								
Cooked and peeled—do	(1)	(1)			156,440	38,760		
Canned—standard cases					146,720	818,097	54,072	303,306
Oysters:								
Fresh-shucked—gallons	130,945	117,026	53,091	$47,351	22,901	21,087	98,556	134,940
Canned—standard cases			86,227	367,838	(1)	(1)	(1)	(1)
Shell products:								
Poultry feed—tons			(1)	(1)			(1)	(1)
Lime—do	(1)	(1)	(1)	(1)			(1)	(1)
Scallops, bay, fresh-shucked gallons							21,600	52,500
Unclassified products:								
Fillets and steaks, fresh pounds	(2)	(2)					[3] 131,412	[3] 35,520
Salted—do							[4] 126,800	[4] 5,250
Canned—standard cases					(2)	(2)	[5] 30,001	[5] 174,445
Miscellaneous		[6] 43,391		[7] 83,703		[8] 56,515		[9] 347,802
Total		984,317		498,892		1,028,599		1,632,733
By fishermen:								
Alewives:								
Corned—pounds	868,500	12,195						
Smoked—do	1,400	91						
Mullet:								
Salted—do	523,500	30,835	15,000	1,800			405,000	17,350
Roe, salted—do							5,300	1,335
Smoked—do							15,500	2,735
Sailfish, smoked—do							18,000	3,600
Shark products:								
Fins—do							450	62
Oil—gallons							450	110
Spot, salted—pounds	243,000	8,500	10,000	600				

See footnotes at end of table.

Industries related to the fisheries of the South Atlantic and Gulf States, 1936—Con.

PRODUCTS MANUFACTURED—Continued

Item	North Carolina		South Carolina		Georgia		Florida	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
By fishermen—Continued								
Crab meat packaged, fresh cooked—pounds							6,300	$2,275
Clams, hard, fresh shucked—gallons							200	360
Oysters, fresh shucked—do	1,870	$1,870	1,074	$1,171	9,863	$7,911	3,055	4,610
Scallops, bay, fresh shucked—gallons	11,700	18,170					8,867	6,558
Sturgeon, caviar, salted—pounds			300	300	85	85		
Total		71,661		3,871		7,996		38,995
Grand total		1,055,978		502,763		1,036,595		1,671,728

Item	Alabama		Mississippi		Louisiana		Texas	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
By manufacturing establishments:								
Mullet, salted—pounds	(1)	(1)	(1)	(1)				
Crab meat, packaged, fresh cooked—pounds	132,800	$36,545	251,247	$76,700	1,035,299	$280,644	(1)	(1)
Shrimp:								
Frozen, packaged—do					1,889,300	253,592	1,832,800	$179,000
Cooked and peeled—do			387,200	127,665	121,814	37,500		
Canned, standard cases	(1)	(1)	218,195	1,058,572	423,222	2,120,856	53,815	274,282
Meal—tons					1,512	29,783		
Sun-dried—pounds					1,645,575	289,079		
Oysters:								
Fresh shucked—gallons	43,500	57,900	43,717	70,407	271,541	457,066	75,182	106,113
Canned, standard cases	24,740	93,400	222,532	920,898	57,567	218,992		
Shell products:								
Poultry feed—tons	(1)	(1)	17,060	67,279	(1)	(1)	(1)	(1)
Lime—do	(1)	(1)	2,220	1,933	(1)	(1)	(1)	(1)
Unclassified products:								
Fillets and steaks, fresh—pounds	(2)	(2)						
Salted—do	(2)	(2)	(2)	(2)				
Canned, standard cases	(2)	(2)	(2)	(2)	(2)	(2)		
Miscellaneous		[10]114,985		[11] 2,825		[12] 313,258		[13] 111,859
Total		302,830		2,326,279		4,000,770		671,254
By fishermen:								
Mullet, salted—pounds	20,000	1,000						
Crab meat packaged, fresh cooked—pounds	30,000	4,800	800	224			7,500	1,900
Shrimp, sun-dried—do					12,400	2,442		
Oysters, fresh shucked—gallons	7,000	7,000	1,650	2,325			1,522	1,570
Total		12,800		2,549		2,442		3,470
Grand total		315,630		2,328,828		4,003,212		674,724

[1] This item has been included under "Unclassified products."
[2] This item has been included under "Miscellaneous."
[3] Includes fresh fillets of amberjack, black and red drum, jewfish, king mackerel, mullet, mangrove and red snapper, snook, Spanish mackerel, gray squeteague, and tripletail; and fresh steaks of cabio, red snapper, and snook.
[4] Includes salted bluefish, blue runner, tenpounder, and Spanish mackerel fillets.
[5] Includes canned hard-clam products, coquina clam broth, oysters, turtle products, and frog products.
[6] Includes fresh fillets of bluefish, croaker, red drum, flounders, king whiting, sea bass, Spanish mackerel, spot, and gray squeteague; smoked red drum and mullet; cooked and peeled shrimp; fresh-shucked hard clams; and oyster-shell lime.
[7] Includes packaged fresh-cooked crab meat, and oyster-shell poultry feed and lime.
[8] Includes pickled shrimp; canned oysters and terrapin products; and menhaden acid scrap and oil.
[9] Includes menhaden meal; shark skins, fins and oil; packaged fresh-cooked sea crawfish meat; oyster-shell poultry feed and lime; and marine-shell novelties.
[10] Includes fresh fillets of Spanish mackerel; fresh steaks of sea bass, and red snapper; frozen fillets of gray squeteague; salted mullet; canned shrimp; and oyster-shell poultry feed and lime.
[11] Includes salted mullet, canned crab and shrimp gumbo, and canned shrimp soup.
[12] Includes canned fish bouillon, fresh-water crawfish, terrapin meat, turtle soup, and frog products; and oyster-shell poultry feed and lime.
[13] Includes packaged fresh-cooked crab meat and oyster-shell poultry feed and lime.

NOTE.—The total value of manufactured products in the South Atlantic and Gulf States was as follows: By manufacturing establishments, $11,445,674; and by fishermen, $143,784. Some of the above products may have been manufactured from products imported from another State or a foreign country; therefore, they cannot be correlated directly with the catch within the State. Of the total number of persons engaged in preparation of fishermen's manufactured products, 1,132 have also been included as fishermen and 415 of the persons shown on transporting craft have also been included as fishermen. This should be considered when computing the total number of persons in the fishery industries exclusive of duplication.

NORTH CAROLINA

Fisheries of North Carolina, 1936

OPERATING UNITS: BY GEAR

Item	Purse seines		Haul seines		Gill nets			
	Menhaden	Other	Common	Long	Anchor	Drift	Runaround	Stake
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	526	--	55	159	193	--	119	--
On boats and shore:								
Regular	--	28	1,967	228	418	36	819	376
Casual	--	--	272	--	224	273	199	61
Total	526	28	2,294	387	835	309	1,137	437
Vessels, motor	32	--	12	51	66	--	41	--
Net tonnage	1,194	--	71	346	394	--	230	--
Boats:								
Motor	--	7	187	93	229	20	162	206
Other	--	5	550	76	114	199	671	123
Accessory boats	64	--	7	49	--	--	--	--
Apparatus:								
Number	32	4	603	72	2,369	219	813	7,143
Length, yards	8,900	800	109,321	83,200				
Square yards	--	--	--	--	1,272,930	153,440	477,175	494,555

Item	Lines			Pound nets	Wheels	Fyke nets	Dip nets	Otter trawls	
	Hand	Trot with baits or snoods	Trot with hooks					Fish	Shrimp
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	10	2	--	--	--	--	--	20	187
On boats and shore:									
Regular	25	1,080	--	474	--	24	371	--	292
Casual	--	148	45	243	12	22	99	--	--
Total	35	1,230	45	717	12	46	470	20	479
Vessels, motor	4	1	--	--	--	--	--	6	68
Net tonnage	30	11	--	--	--	--	--	131	458
Boats:									
Motor	9	287	6	369	1	26	5	--	146
Other	--	543	18	205	6	6	293	--	--
Apparatus:									
Number	70	831	24	2,434	13	670	425	6	214
Yards at mouth	--	--	--	--	--	--	--	140	3,866
Hooks, baits, or snoods	140	648,000	3,300	--	--	--	--	--	--

Item	Traps		Pots		Spears	Dredges	
	Box	Turtle	Eel	Fish		Crab	Oyster
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	--	--	--	--	--	--	200
On boats and shore:							
Regular	--	26	19	--	363	18	166
Casual	3	--	41	14	93	--	--
Total	3	26	60	14	456	18	366
Vessels, sail	--	--	--	--	--	--	67
Net tonnage	--	--	--	--	--	--	613
Boats:							
Motor	--	10	22	--	10	10	98
Other	3	13	27	14	387	--	10
Apparatus:							
Number	6	510	2,132	46	456	20	277
Yards at mouth	--	--	--	--	--	20	293

Fisheries of North Carolina, 1936—Continued

OPERATING UNITS: By gear—Continued

Item	Tongs, oyster	Rakes		Hooks, stone crab	By hand		Total, exclusive of duplication
		Oyster	Other		Oyster	Other	
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	3	2					1,175
On boats and shore:							
Regular	208		750	2	93	55	3,845
Casual	11		369			30	1,882
Total	222	2	1,119	2	93	85	6,902
Vessels:							
Motor	2	1					180
Net tonnage	12	11					2,191
Sail							67
Net tonnage							613
Total vessels	2	1					247
Total net tonnage	12	11					2,804
Boats:							
Motor	24		19		11		1,362
Other	186		598	2	62	55	2,516
Accessory boats							120
Apparatus, number	219	2	1,119	2			

CATCH: By gear

Species	Purse seines				Haul seines			
	Menhaden		Other		Common		Long	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives					991,700	$11,708	8,500	$111
Bluefish	19,000	$1,130			612,000	28,957	196,300	13,755
Bowfin					4,100	41		
Butterfish					7,800	156		
Carp					262,800	6,088	400	8
Catfish and bullheads					57,200	1,163	600	12
Croaker					388,000	4,145	5,496,400	54,964
Drum, red or redfish					112,100	3,403	28,400	852
Flounders					32,000	1,700	19,000	950
Gizzard shad					28,100	281		
Harvestfish or "starfish"					34,200	352	39,300	562
Hickory shad					31,200	686		
King whiting or "kingfish"					74,500	1,834	21,500	418
Mackerel					1,000	10		
Menhaden	149,813,400	598,680			200,000	340	75,000	125
Mullet			5,000	$150	3,887,400	131,950	18,400	552
Pigfish					4,000	40	9,200	92
Pike or pickerel					800	30		
Pinfish or sailors choice							30,000	50
Pompano					14,000	1,725	3,200	320
Shad					98,800	15,852	8,400	1,354
Sharks							1,100	22
Sheepshead					14,600	615	4,100	205
Spadefish					3,500	70		
Spanish mackerel					10,800	648		
Spot					4,187,800	94,070	1,004,600	17,002
Squeteagues or "sea trout":								
Gray					314,800	13,012	1,877,400	57,365
Spotted					509,400	34,945	676,600	39,124
Striped bass			100,000	5,000	93,500	8,318	44,600	3,614
Sturgeon							300	28
White perch					63,300	3,230	500	25
Yellow perch					14,100	705		
Yellowtail					100	2		
Crabs, soft and peelers					162,900	46,468		
Shrimp					115,200	8,776		
Total	149,832,400	599,810	105,000	5,150	12,331,700	421,320	9,563,800	191,510

Fisheries of North Carolina, 1936—Continued

CATCH: BY GEAR—Continued

Species	Gill nets							
	Anchor		Drift		Runaround		Stake	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	441,600	$5,050	79,500	$1,175	2,000	$35	164,800	$2,577
Bluefish					771,500	38,555	280,100	17,364
Bowfin	700	7					100	1
Carp	21,300	426	300	9	3,000	90	12,200	344
Catfish and bullheads	36,000	720	4,800	96	1,000	20	6,700	134
Croaker	1,435,300	14,523			51,000	1,015	335,800	4,498
Drum, red or redfish	1,500	45			55,000	1,480	1,000	30
Flounders	1,100	55			36,000	2,450	15,000	1,100
Gizzard shad	4,300	43					100	1
Hickory shad	30,300	1,106	7,800	235			16,800	424
King whiting or "kingfish"	679,300	18,504			2,400	57		
Mullet	17,300	533			2,422,800	85,421	107,900	3,280
Pigfish							700	7
Shad	203,200	32,191	97,200	16,390			109,700	17,713
Spanish mackerel					300,000	13,500	70,600	4,526
Spot	160,000	4,000			1,840,000	47,110	116,100	2,077
Squeteagues or "sea trout":								
Gray	2,394,500	96,894			5,000	200	124,500	5,095
Spotted	56,800	3,860			97,000	6,850	16,000	1,120
Striped bass	103,200	9,437	1,500	145			89,300	8,187
Sturgeon	2,100	209					100	9
Suckers	800	16					800	16
White perch	11,800	617	3,300	168			38,600	1,930
Yellow perch	700	35					200	10
Yellowtail	100	5						
Crabs, hard							4,500	100
Total	5,601,900	188,276	194,400	18,218	5,586,700	196,783	1,511,600	70,543

Species	Lines						Pound nets		Wheels	
	Hand		Trot with baits or snoods		Trot with hooks					
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives							9,963,100	$104,003	68,500	$1,250
Bluefish	2,000	$120					146,900	9,737		
Bowfin							1,500	15		
Butterfish							350,600	5,372		
Carp					500	$25	100,500	2,199		
Catfish and bullheads					38,000	810	242,300	4,757	1,000	20
Croaker							1,864,600	21,281		
Drum, red or redfish							53,100	1,593		
Eels, common							5,700	143		
Flounders							185,700	8,335		
Gizzard shad							8,500	85		
Harvestfish or "starfish"							819,600	10,386		
Hickory shad							134,000	4,126		
Mullet							12,000	400		
Pigfish							15,800	158		
Sea bass	107,000	4,280								
Shad							578,000	93,127		
Sheepshead							2,000	100		
Spadefish							1,400	28		
Spanish mackerel							52,000	2,940		
Spot							134,700	2,424		
Squeteagues or "sea trout":										
Gray							4,220,400	140,490		
Spotted							43,400	2,570		
Striped bass					4,600	595	319,800	25,001		
Sturgeon							2,200	200		
Suckers							3,800	190		
White perch							24,600	1,607	1,000	60
Yellow perch							1,500	125		
Yellowtail							5,000	100		
Crabs, hard			5,770,500	$118,716						
Shrimp							52,100	3,109		
Total	109,000	4,400	5,770,500	118,716	43,100	1,430	19,344,800	444,661	70,500	1,330

Fisheries of North Carolina, 1936—Continued

CATCH: By GEAR—Continued

Species	Fyke nets		Dip nets		Otter trawls		Traps	
							Box	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	129,300	$1,931	79,600	$1,835				
Bowfin	400	4						
Carp	109,500	4,910					300	$9
Catfish and bullheads	81,700	1,664					1,500	50
Croaker					172,000	$4,300		
Eels, common	900	25						
Flounders	1,200	60			623,200	35,550		
Gizzard shad	1,500	15						
Hickory shad	900	27						
King whiting or "kingfish"					438,300	10,680		
Mullet	100	5						
Pike or pickerel	300	15						
Squeteagues or "sea trout," gray					32,500	1,136		
Striped bass	11,300	960						
Suckers	1,100	55						
White perch	21,600	1,080					600	60
Yellow perch	7,100	355						
Yellowtail	100	5						
Crabs:								
Hard					345,000	8,400		
Soft and peelers			53,000	14,018				
Shrimp					3,647,700	107,656		
Turtles, snapper	600	24						
Total	367,600	11,135	132,600	15,853	5,258,700	167,722	2,400	119

Species	Traps—Contd.		Pots		Spears		Dredges	
	Turtle							
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Eels, common			57,400	$3,258				
Flounders					262,000	$16,720		
White perch			28,000	1,440				
Crabs, hard							255,000	$5,100
Oysters, market:								
Public, spring							705,200	40,013
Public, fall							1,243,500	81,721
Turtles, snapper	29,500	$1,103						
Total	29,500	1,103	85,400	4,698	262,000	16,720	2,203,700	126,839

Species	Tongs		Rakes		Hooks		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs, stone					800	$100		
Clams, hard, public	40,500	$4,690	766,000	$67,696			33,000	$2,940
Oysters, market:								
Public, spring	110,100	7,437					68,400	4,385
Public, fall	187,300	13,100					108,000	7,320
Private, spring	19,800	2,300						
Private, fall	38,200	4,350						
Scallops, bay			99,200	14,175				
Total	395,900	31,877	865,200	81,871	800	100	209,400	14,645

Fisheries of North Carolina, 1936—Continued

OPERATING UNITS: By counties

Item	Beaufort	Bertie	Bladen	Brunswick	Camden	Carteret	Chowan	Craven
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	122			110		781		
On boats and shore:								
Regular	136			428		1,316		40
Casual	112	66	100	99	17	424	169	8
Total	370	66	100	637	17	2,521	169	48
Vessels:								
Motor	2			22		123		
Net tonnage	18			268		1,681		
Sail	39					8		
Net tonnage	354					89		
Total vessels	41			22		131		
Total net tonnage	372			268		1,770		
Boats:								
Motor	48	17		69	3	328	70	23
Other	110	7	100	258	12	857	10	15
Accessory boats	2			6		96		
Apparatus:								
Purse seines, menhaden				3		29		
Length, yards				900		8,000		
Haul seines:								
Common	5	2		21		380	1	4
Length, yards	3,000	2,000		4,320		37,588	375	1,000
Long	2					28		
Length, yards	2,400					31,600		
Gill nets:								
Anchor				35	42	125	217	
Square yards				17,200	4,200	303,500	86,600	
Drift			100	12				
Square yards			15,000	4,800				
Runaround	49			187		146		6
Square yards	19,000			36,200		178,600		5,400
Stake	317			2	90	1,810		600
Square yards	11,355			400	4,510	72,790		28,800
Lines:								
Hand						12		
Hooks and baits						24		
Trot with baits or snoods	100			43		217		15
Baits or snoods	84,600			9,900		195,400		7,500
Pound nets	65	128				139	661	
Fyke nets					32			
Dip nets						376		
Otter trawls:								
Fish						5		
Yards at mouth						120		
Shrimp				57		147		
Yards at mouth				1,110		2,551		
Pots, eel	25							
Spears				220		50		
Dredges, oyster	91					16		
Yards at mouth	118					18		
Tongs, oyster						64		
Rakes:								
Oyster						2		
Other				60		1,039		
Hooks, stone crab				2				

Fisheries of North Carolina, 1936—Continued

OPERATING UNITS: By counties—Continued

Item	Currituck	Dare	Gates	Hertford	Hyde	Martin	New Hanover
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels		39			17		11
On boats and shore:							
Regular	99	733			188		151
Casual	82	2	10	40		134	259
Total	181	774	10	40	205	134	421
Vessels:							
Motor		12			2		4
Net tonnage		67			13		37
Sail					4		
Net tonnage					30		
Total vessels		12			6		4
Total net tonnage		67			43		37
Boats:							
Motor	77	333	1	3	70	9	34
Other	72	252	9	13	83	54	220
Accessory boats		4					
Apparatus:							
Purse seines, other than for menhaden		4					
Length, yards		800					
Haul seines:							
Common	45	59		3	6	2	23
Length, yards	18,130	27,550		525	1,575	700	2,610
Long		21					
Length, yards		24,100					
Gill nets:							
Anchor	178	569			4		8
Square yards	63,375	199,130			16,000		
Drift			6	2		9	78
Square yards			1,200	280		11,800	117,000
Runaround		64			26		135
Square yards		155,850			20,800		23,350
Stake	48	2,758			585		80
Square yards	6,000	212,000			57,700		6,000
Lines:							
Trot with baits or snoods	13	45			40		97
Baits or snoods	10,000	48,600			30,000		55,000
Trot with hooks						18	6
Hooks						900	2,400
Pound nets	13	960	12	32	89		
Wheels						13	
Fyke nets	302						
Dip nets	10					35	
Otter trawls, shrimp							4
Yards at mouth							95
Traps:							
Box						6	
Turtle	120	390					
Pots:							
Eel	1,785	225					
Fish						46	
Spears		40			10		61
Dredges:							
Crab		20					
Yards at mouth		20					
Oyster					33		
Yards at mouth					45		
Tongs, oyster					2		15
Rakes, other than for oysters					20		

Fisheries of North Carolina, 1936—Continued

OPERATING UNITS: By counties—Continued

Item	Onslow	Pamlico	Pasquotank	Pender	Perquimans	Tyrrell	Washington
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	8	84	3				
On boats and shore:							
Regular	282	262		176		34	
Casual	19	36	48	11	77	74	95
Total	309	382	51	187	77	108	95
Vessels:							
Motor	2	12	1				
Net tonnage	12	78	17				
Sail		16					
Net tonnage		140					
Total vessels	2	28	1				
Total net tonnage	12	218	17				
Boats:							
Motor	40	133	21		18	45	20
Other	193	75	1	64	30	47	34
Accessory boats		12					
Apparatus:							
Haul seines:							
Common	25	3	1	18	3		2
Length, yards	3,500	600	300	3,548	600		1,400
Long		21					
Length, yards		25,100					
Gill nets:							
Anchor	8		218		534	147	292
Square yards	2,000		54,625		292,000	88,300	146,000
Drift							12
Square yards							3,360
Runaround	141	35	1	23			
Square yards	25,900	8,800	375	2,900			
Stake		375			28	450	
Square yards		24,400			2,800	67,800	
Lines:							
Hand	58						
Hooks and baits	116						
Trot with baits or snoods	135	102		24			
Baits or snoods	105,000	90,500		11,500			
Pound nets		100	12		78	77	68
Fyke nets			54		12	270	
Dip nets							4
Otter trawls:							
Fish			1				
Yards at mouth			20				
Shrimp	1	5					
Yards at mouth	20	90					
Pots, eel			19		66		12
Spears	25			50			
Dredges, oyster		137					
Yards at mouth		112					
Tongs, oyster	125	13					

CATCH: By counties

Species	Beaufort		Bertie		Bladen	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	37,000	$555	1,392,000	$13,920		
Carp	45,500	1,365				
Catfish and bullheads	11,000	220	29,300	622		
Croaker	575,000	5,825				
Eels, common	2,500	75				
Flounders	4,500	270				
Harvestfish or "starfish"	29,000	570				
Hickory shad	5,000	150			7,500	$225
Mullet	136,000	4,240				
Shad	26,500	4,240	15,600	2,190	11,000	2,575
Spanish mackerel	1,000	70				
Spot	81,000	820				
Squeteagues or "sea trout":						
Gray	142,000	4,520				
Spotted	90,500	4,735				
Striped bass	8,700	783	13,700	1,255		
White perch	7,500	375	6,200	510		
Yellow perch	1,000	50				
Crabs, hard	935,200	20,160				
Oysters, market:						
Public, spring	281,400	15,856				
Public, fall	496,800	37,024				
Total	2,917,100	101,903	1,456,800	18,497	18,500	2,800

Fisheries of North Carolina, 1936—Continued

CATCH: BY COUNTIES—Continued

Species	Brunswick		Camden		Carteret	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives			7,400	$109	4,000	$80
Bluefish	15,000	$930			1,076,400	47,351
Bowfin			200	2		
Butterfish					330,000	4,960
Carp			6,400	188		
Catfish and bullheads			5,300	106		
Croaker	28,000	640			3,023,400	32,964
Drum, red or redfish	20,000	600			77,000	2,400
Flounders	219,200	14,430			639,200	34,700
Gizzard shad			100	1		
Harvestfish or "starfish"					227,400	3,448
Hickory shad			2,000	60	85,000	2,410
King whiting or "kingfish"	246,300	4,935			672,100	15,953
Menhaden	19,091,000	75,500			130,997,400	523,645
Mullet	1,378,500	48,222	7,100	250	2,858,300	97,191
Pinfish or sailors choice					30,000	50
Pompano					13,000	1,625
Sea bass					59,000	2,360
Shad	35,000	5,600	800	132	38,700	7,623
Sheepshead					14,500	610
Spanish mackerel					356,600	16,966
Spot	2,405,300	60,210			2,429,100	44,482
Squeteagues or "sea trout":						
Gray					3,030,700	112,144
Spotted	35,000	2,450			501,200	33,910
Striped bass			7,300	660	500	50
Suckers			1,600	32		
White perch			3,700	185		
Yellow perch			1,600	80		
Crabs:						
Hard	135,000	2,700			1,788,000	37,635
Soft and peelers					207,400	58,090
Stone	800	100				
Shrimp	1,684,700	50,541			1,892,000	54,685
Clams, hard, public	57,500	6,430			758,000	66,796
Oysters, market:						
Public, spring					159,100	11,531
Public, fall	3,200	420			322,700	16,141
Scallops, bay					99,200	14,175
Turtles, snapper			100	4		
Total	25,354,500	273,708	43,600	1,809	151,689,900	1,243,975

Species	Chowan		Craven		Currituck		Dare	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	7,885,800	$78,858	4,200	$63	18,300	$259	67,500	$1,021
Bluefish					2,000	180	799,900	53,317
Bowfin					4,600	46		
Butterfish							23,400	468
Carp	2,800	70	2,800	28	257,500	6,565	90,500	2,101
Catfish and bullheads	95,700	1,915	2,200	22	45,700	944	23,300	466
Croaker			203,000	3,045	3,000	30	2,560,900	25,659
Drum, red or redfish							126,600	3,798
Eels, common					42,900	2,618	11,500	562
Flounders					3,000	150	139,500	7,375
Gizzard shad	900	9			30,500	305		
Harvestfish or "starfish"					1,000	20	303,100	3,331
Hickory shad	5,000	350	8,000	160	200	6	63,400	1,898
King whiting or "kingfish"					4,200	105	53,500	1,210
Mackerel							1,000	10
Mullet			51,800	2,330	2,000	60	188,700	5,691
Pigfish							29,700	297
Pike or pickerel					500	15		
Pompano							2,600	260
Shad	26,800	4,140	1,200	240	42,000	6,720	587,600	94,016
Sharks							1,100	22
Sheepshead							3,100	155
Spadefish							4,800	96
Spanish mackerel							54,800	3,288
Spot					3,000	60	367,000	7,190
Squeteagues or "sea trout":								
Gray					10,000	400	3,047,100	122,830
Spotted			24,700	1,970	1,000	50	481,000	26,860
Striped bass	15,000	1,257	1,100	108	34,900	3,435	474,800	34,393
Sturgeon							4,600	437
Suckers							1,900	95
White perch	1,700	136			55,300	2,675	13,400	670

Fisheries of North Carolina, 1936—Continued

CATCH: BY COUNTIES—Continued

Species	Chowan		Craven		Currituck		Dare	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Yellow perch					16,100	$805		
Yellowtail							5,100	$102
Crabs:								
Hard			90,000	$1,800	85,000	1,675	745,500	14,980
Soft and peelers					8,500	2,396		
Shrimp							50,400	3,012
Turtles, snapper					9,500	323	20,000	780
Total	8,033,700	$86,735	389,000	9,766	680,700	29,842	10,347,300	416,390

Species	Gates		Hertford		Hyde		Martin	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	112,000	$1,010	656,500	$6,105			324,100	$5,395
Bluefish					109,000	$6,310		
Butterfish					5,000	100		
Carp							1,200	46
Catfish and bullheads	10,000	100	3,000	75			37,300	766
Croaker					746,400	9,634		
Drum, red or redfish					17,100	343		
Flounders					42,100	2,180		
Harvestfish or "starfish"					238,600	2,886		
King whiting or "kingfish"					8,400	192		
Mullet					78,000	2,850		
Shad			300	60	8,100	1,296		
Spadefish					100	2		
Spanish mackerel					21,000	1,290		
Spot					28,300	566		
Squeteagues or "sea trout":								
Gray					1,674,400	47,080		
Spotted					44,000	3,020		
Striped bass	3,500	350	3,000	300	1,600	149	6,400	770
White perch	1,000	25			500	25	33,400	1,788
Yellow perch			1,000	100				
Crabs, hard					322,900	6,840		
Shrimp					1,700	97		
Clams, hard, public					24,000	2,100		
Oysters, market:								
Public, spring					121,800	6,381		
Public, fall					132,500	7,721		
Total	126,500	1,485	663,800	6,640	3,625,500	101,062	402,400	8,765

Species	New Hanover		Onslow		Pamlico		Pasquotank	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives			2,000	$35	8,000	$120	9,700	$147
Bluefish	500	$30			25,000	1,500		
Bowfin							600	6
Carp							12,700	254
Catfish and bullheads	5,000	150					29,100	582
Croaker	18,000	300	5,000	75	2,530,400	25,304	50,000	1,250
Drum, red or redfish			1,700	51	3,700	111		
Eels, common							1,800	45
Flounders	36,000	2,200	16,000	950	16,800	870	32,500	2,225
Gizzard shad							2,400	24
Harvestfish or "starfish"					94,000	1,045		
Hickory shad					11,000	330	1,700	51
King whiting or "kingfish"	4,000	60	202,000	8,040	5,500	98	20,000	900
Mullet	552,000	19,057	677,000	23,483	110,000	3,900	4,600	138
Pike or pickerel							300	15
Pompano					1,600	160		
Sea bass			48,000	1,920				
Shad	91,500	14,640			63,200	10,012	23,000	3,680
Sheepshead					3,100	155		
Spot	559,500	14,910	346,000	8,445	40,000	450		
Squeteagues or "sea trout":								
Gray			80,000	4,000	975,700	22,887	8,500	303
Spotted	18,000	1,000	60,000	4,600	139,800	9,674		
Striped bass					1,000	100	29,800	2,640
Sturgeon							100	9
Suckers							700	35
White perch							8,400	420
Yellowtail							100	5
Crabs, hard	340,000	6,800	718,800	14,826	1,060,600	21,800		
Shrimp	134,000	9,020	15,200	936	35,000	1,050		
Oysters, market:								
Public, spring	40,000	2,755	38,300	3,250	236,700	11,517		
Public, fall	74,800	5,170	75,600	6,400	423,200	28,415		
Private, spring			19,800	2,300				
Private, fall			38,200	4,350				
Total	1,873,300	76,092	2,343,600	83,661	5,784,300	139,498	236,000	12,729

Fisheries of North Carolina, 1936—Continued

CATCH: BY COUNTIES—Continued

Species	Pender		Perquimans		Tyrrell		Washington	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives			133,000	$1,995	684,500	$10,873	582,600	$9,130
Bowfin			900	9	500	5		
Carp			20,600	412	56,500	2,740	14,300	339
Catfish and bullheads			63,500	1,270	82,000	1,640	28,400	568
Drum, red or redfish	5,000	$100						
Eels, common			3,700	93	100	3	1,500	30
Flounders	25,000	1,500	1,300	65	100	5		
Gizzard shad			8,500	85	100	1		
Hickory shad			11,800	354	3,600	105	16,800	505
Mullet	415,000	14,525	8,300	249	3,600	105		
Pike or pickerel			300	15				
Shad			48,100	7,696	36,000	5,760	39,900	6,007
Spot	1,184,000	29,550						
Squeteagues or "sea trout":								
Gray			700	28				
Spotted	4,000	200						
Striped bass			27,200	2,448	119,200	10,750	20,100	1,809
Suckers			1,300	65	1,000	50		
White perch			8,000	400	33,600	1,680	20,600	1,328
Yellow perch			300	15	3,600	180		
Yellowtail			100	5				
Crabs, hard	154,000	3,100						
Shrimp	2,000	200						
Oysters, market:								
Public, spring	6,400	550						
Public, fall	10,000	850						
Turtles, snapper			500	20				
Total	1,805,400	50,575	338,100	15,224	1,024,400	33,897	724,200	19,716

SEED OYSTER FISHERY: BY GEAR

Item	Oyster dredges	
OPERATING UNITS		
Fishermen, on boats and shore:	*Number*	
Regular	55	
Casual	45	
Total	100	
Boats, motor	37	
Apparatus, number	37	
Yards at mouth	25	
CATCH	*Bushels*	*Value*
Oysters, seed, public, spring	55,500	$11,100

NOTE.—Of the persons and gear employed in the seed oyster fishery 38 regular fishermen and 14 motorboats are duplicated among those in the market oyster fishery or fisheries for other species. The seed oyster fishery in North Carolina is confined to Hyde County.

SOUTH CAROLINA

Fisheries of South Carolina, 1936

OPERATING UNITS: By gear

Item	Haul seines	Gill nets				Lines		Cast nets
		Anchor	Drift	Run-around	Stake	Hand	Trot with baits or snoods	
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels						8		
On boats and shore:								
Regular	111	80	72	89	20	138	291	40
Casual	210	250	112	30	10		15	3
Total	321	330	184	119	30	146	306	43
Vessels, motor						1		
Net tonnage						8		
Boats:								
Motor	3	20	12	2		5		2
Other	38	236	82	66	20	37	194	20
Apparatus:								
Number	46	247	93	67	20	204	194	28
Length, yards	7,325							
Square yards		161,760	77,800	35,200	18,700			
Hooks, baits, or snoods						319	97,800	

Item	Otter trawls, shrimp	Pots, fish	Spears	Dredges, oyster	Tongs, oyster	Grabs	By hand		Total, exclusive of duplication
							Oyster	Other	
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	19			9					36
On boats and shore:									
Regular	45	13	80		18	152	172		753
Casual		4	42				110	160	806
Total	64	17	122	9	18	152	282	160	1,595
Vessels, motor	7			2					10
Net tonnage	97			25					130
Boats:									
Motor	21	1	2						55
Other		11	85		9	152	225	60	820
Apparatus:									
Number	28	53	122	3	18	152			
Yards at mouth	596			5					

CATCH: By gear

Species	Haul seines		Gill nets					
			Anchor		Drift		Runaround	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish	1,000	$80					2,000	$140
Drum:								
Black	29,500	680					12,500	500
Red or redfish	62,500	2,450					41,900	3,154
Flounders							2,000	120
Hickory shad					400	$5		
King whiting or "kingfish"	71,000	2,550					1,000	50
Mullet	617,400	24,020					129,900	6,499
Permit	8,000	400						
Shad			112,800	$17,840	42,500	6,828		
Sheepshead							2,000	100
Spot	616,800	12,250					45,900	1,489
Squeteagues or "sea trout":								
Gray							3,000	210
Spotted	57,500	3,670					23,500	2,200
Sturgeon			9,000	585	49,500	3,465		
Shrimp	4,000	400						
Terrapin, diamond back	1,800	190						
Total	1,469,500	46,690	121,800	18,425	92,400	10,298	263,700	14,460

Fisheries of South Carolina, 1936—Continued

CATCH: BY GEAR—Continued

Species	Gill nets—Continued		Lines				Cast nets	
	Stake		Hand		Trot with baits or snoods			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish			6,600	$665				
Grunts			8,000	500				
Hickory shad	400	$5						
King whiting or "kingfish"			45,000	3,150				
Sea bass			162,900	11,020				
Sea catfish			150,000	4,000				
Shad	21,800	3,408						
Sharks			75,000	750				
Squeteagues or "sea trout," spotted			15,000	1,000				
Crabs, hard					1,626,400	$17,987		
Shrimp							82,000	$6,150
Total	22,200	3,413	462,500	21,085	1,626,400	17,987	82,000	6,150

Species	Otter trawls		Pots		Spears		Dredges	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Catfish and bullheads			121,200	$4,381				
Flounders	7,000	$280			55,500	$4,750		
Squeteagues or "sea trout," spotted					2,000	140		
Shrimp	1,014,800	30,474						
Oysters, market:								
Private, spring							87,500	$10,550
Private, fall							3,800	188
Total	1,021,800	30,754	121,200	4,381	57,500	4,890	91,300	10,738

Species	Tongs		Grabs		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs, soft and peelers					9,200	$550
Clams, hard, public					20,200	1,780
Oysters, market:						
Public, spring			800	$49	1,700	194
Public, fall			2,000	121	4,700	455
Private, spring	90,500	$4,527	1,364,000	67,925	610,400	29,536
Private, fall	32,500	2,040	513,100	25,597	406,900	21,434
Total	123,000	6,567	1,879,900	93,692	1,053,100	53,949

OPERATING UNITS: BY COUNTIES

Item	Beaufort	Charleston	Colleton	Georgetown	Horry	Jasper
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	4	30		2		
On boats and shore:						
Regular	293	221		179	33	27
Casual	138	152	78	205	233	
Total	435	403	78	386	266	27
Vessels, motor	1	8		1		
Net tonnage	22	99		9		
Boats:						
Motor	15	11		26	2	1
Other	284	221	68	144	82	21
Apparatus:						
Haul seines	3	3		25	15	
Length, yards	600	450		3,475	2,800	
Gill nets:						
Anchor	41	52	58	61	35	
Square yards	13,500	14,160	14,600	117,000	2,500	
Drift	28	20	10	31	4	
Square yards	14,000	14,000	7,000	42,000	800	
Runaround	1	5		45	15	1
Square yards	800	1,800		29,750	2,250	600
Stake				10	10	
Square yards				18,000	700	

Fisheries of South Carolina, 1936—Continued

OPERATING UNITS: By counties—Continued

Item	Beaufort	Charleston	Colleton	Georgetown	Horry	Jasper
Apparatus—Continued.						
Lines:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Hand	100	77		9	18	
Hooks	100	138		27	54	
Trot with baits or snoods	121	73				
Baits or snoods	72,000	25,800				
Cast nets		28				
Otter trawls, shrimp	11	11		6		
Yards at mouth	225	253		118		
Pots, fish	25			28		
Spears	50	6		58	8	
Dredges, oyster		3				
Yards at mouth		5				
Tongs, oyster		18				
Grabs	88	64				

CATCH: By counties

Species	Beaufort		Charleston		Colleton	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish			6,600	$665		
Catfish and bullheads	28,200	$1,171				
Drum:						
Black	25,000	500	2,000	80		
Red or redfish	51,500	1,825	25,000	2,000		
Flounders	22,000	1,780	4,000	240		
Grunts			8,000	500		
King whiting or "kingfish"	50,500	1,525	45,000	3,150		
Mullet	25,000	850	15,000	750		
Sea bass	10,000	800	133,400	8,270		
Sea catfish			150,000	4,000		
Shad	7,000	1,260	39,700	6,280	35,200	$5,640
Sharks			75,000	750		
Sheepshead			2,000	100		
Spot	6,000	140	1,000	30		
Squeteagues or "sea trout," spotted	52,000	3,200	23,000	1,700		
Sturgeon					9,000	585
Crabs:						
Hard	973,200	9,985	653,200	8,002		
Soft and peelers			9,200	550		
Shrimp	365,900	11,007	574,200	20,916		
Oysters, market:						
Public, spring			800	49		
Public, fall			2,000	121		
Private, spring	1,107,500	53,980	999,900	56,158		
Private, fall	511,700	24,010	404,600	23,149		
Terrapin, diamond back			1,800	190		
Total	3,235,500	112,033	3,175,400	137,650	44,200	6,225

Species	Georgetown		Horry		Jasper	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish	3,000	$220				
Catfish and bullheads	93,000	3,210				
Drum:						
Black	15,000	600				
Red or redfish	26,900	1,729			1,000	$50
Flounders	37,000	3,040	1,500	$90		
Hickory shad			800	10		
King whiting or "kingfish"			21,000	1,050	500	25
Mullet	506,900	19,899	195,400	8,770	5,000	250
Permit	1,000	50	7,000	350		
Sea bass	7,500	750	12,000	1,200		
Shad	88,200	13,770	7,000	1,126		
Spot	490,900	8,849	162,800	4,640	2,000	80
Squeteagues or "sea trout":						
Gray	3,000	210				
Spotted	21,000	1,930	1,000	80	1,000	100
Sturgeon	49,500	3,465				
Shrimp	160,700	5,101				
Clams, hard, public	17,000	1,500	3,200	280		
Oysters, market:						
Public, spring	500	34	1,200	160		
Public, fall	2,300	155	2,400	300		
Private, spring					45,000	2,400
Private, fall					40,000	2,100
Total	1,523,400	64,512	415,300	18,056	94,500	5,005

GEORGIA

Fisheries of Georgia, 1936

OPERATING UNITS: BY GEAR

Item	Purse seines, menhaden	Haul seines	Gill nets				Lines		
			Anchor	Drift	Run-around	Stake	Hand	Trot with baits or snoods	Trot with hooks
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	43								
On boats and shore:									
Regular		16		32	30	1	20	308	1
Casual		6	6	267	40	106	48		1
Total	43	22	6	299	70	107	68	308	2
Vessels, motor	2								
Net tonnage	92								
Boats:									
Motor					13				
Other		11	6	160	50	94	40	181	2
Accessory boats	4								
Apparatus:									
Number	2	11	25	160	35	258	348	181	2
Length, yards	600	1,132							
Square yards			1,875	99,150	16,000	26,650			
Hooks, baits, or snoods							348	87,000	325

Item	Otter trawls, shrimp	Pots		Tongs, oyster	Grabs	By hand		Total, exclusive of duplication
		Crab	Fish			Oyster	Other	
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	121							164
On boats and shore:								
Regular	255	86		7	17	76	8	712
Casual			22					456
Total	376	86	22	7	17	76	8	1,332
Vessels, motor	53							55
Net tonnage	416							508
Boats:								
Motor	124							137
Other		74	11	7	17	76		576
Accessory boats								4
Apparatus:								
Number	177	436	55	7	17			
Yards at mouth	3,860							

CATCH: BY GEAR

Species	Purse seines		Haul seines		Gill nets			
					Anchor		Drift	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Hickory shad							15,600	$312
Menhaden	14,500,000	$58,000						
Shad					3,800	$850	175,000	29,990
Sturgeon							10,400	538
Terrapin, diamond back			16,700	$2,640				
Total	14,500,000	58,000	16,700	2,640	3,800	850	201,000	30,840

Fisheries of Georgia, 1936—Continued

CATCH: By gear—Continued

Species	Gill nets—Continued				Lines					
	Runaround		Stake		Hand		Trot with baits or snoods		Trot with hooks	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Catfish and bullheads									3,200	$150
Croaker	5,000	$200								
Drum:										
Black	10,000	400								
Red or redfish	50,000	2,550								
Flounders	4,000	250								
Hickory shad			5,300	$106						
King whiting or "kingfish"	6,000	300								
Mullet	17,000	850								
Shad			57,200	11,372						
Sheepshead	10,000	400								
Spot	10,000	400								
Squeteagues or "sea trout," spotted	115,000	10,700								
Crabs, hard					287,400	$4,311	1,326,200	$19,898		
Total	227,000	16,050	62,500	11,478	287,400	4,311	1,326,200	19,898	3,200	150

Species	Otter trawls		Pots		Tongs		Grabs		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Catfish and bullheads			34,000	$1,530						
Flounders	4,500	$225								
King whiting or "kingfish"	69,500	1,040								
Crabs, hard	119,400	2,276	449,200	6,548						
Shrimp	9,714,800	291,402								
Oysters, market:										
Private, spring					50,000	$3,120	22,700	$1,247	135,500	$8,959
Private, fall					25,000	1,570	200	11	96,700	6,159
Terrapin, diamond back									3,000	475
Total	9,908,200	294,943	483,200	8,078	75,000	4,690	22,900	1,258	235,200	15,593

OPERATING UNITS: By counties

Item	Bryan	Bullock	Camden	Charlton	Chatham	Effingham
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels			60		27	
On boats and shore:						
Regular			108		106	
Casual	62	15	18	12	179	6
Total	62	15	186	12	312	6
Vessels, motor			10		9	
Net tonnage			156		115	
Boats:						
Motor			15		34	
Other	36	14	64	12	124	6
Accessory boats			4			
Apparatus:						
Purse seines, menhaden			2			
Length, yards			600			
Haul seines					4	
Length, yards					332	
Gill nets:						
Anchor						25
Square yards						1,875
Drift	25		20		58	
Square yards	12,350		10,000		33,000	
Runaround					20	
Square yards					10,000	
Stake	51	56	40	18	6	
Square yards	4,956	1,890	5,600	3,600	504	
Lines:						
Hand					348	
Baits					348	
Trot with baits or snoods			40		21	
Baits or snoods			20,000		7,000	
Otter trawls, shrimp			23		34	
Yards at mouth			496		758	
Pots, crab			50		216	
Tongs, oyster					7	

Fisheries of Georgia, 1936—Continued

OPERATING UNITS: By counties—Continued

Item	Glynn	Liberty	Long	McIntosh	Screven	Tattnall	Wayne
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	71			6			
On boats and shore:							
Regular	213	85		199			1
Casual	70		3	38	17	20	16
Total	354	85	3	243	17	20	17
Vessels, motor	33			3			
Net tonnage	218			19			
Boats:							
Motor	48			40			
Other	119	50	2	100	17	20	12
Apparatus:							
Haul seines	7						
Length, yards	800						
Gill nets:							
Drift	32			25			
Square yards	25,200			18,600			
Runaround	15						
Square yards	6,000						
Stake			5		50	20	12
Square yards			400		2,500	3,600	3,600
Lines:							
Trot with baits or snoods	45	35		40			
Baits or snoods	22,500	17,500		20,000			
Trot with hooks					1		1
Hooks					25		300
Otter trawls, shrimp	77			43			
Yards at mouth	1,681			925			
Pots:							
Crab	60	50		60			
Fish				55			
Grabs				17			

CATCH: By counties

Species	Bryan		Bullock		Camden		Charlton	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Menhaden					14,500,000	$58,000		
Shad	43,000	$7,500	5,000	$1,062	26,000	5,200	10,000	$2,000
Sturgeon					1,400	68		
Crabs, hard					373,000	5,600		
Shrimp					1,540,500	46,215		
Total	43,000	7,500	5,000	1,062	16,440,900	115,083	10,000	2,000

Species	Chatham		Effingham		Glynn		Liberty	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Croaker					5,000	$200		
Drum:								
Black					10,000	400		
Red or redfish	15,000	$800			35,000	1,750		
Flounders	4,500	225			4,000	250		
Hickory shad	3,500	70			6,000	120		
King whiting or "kingfish"	69,500	1,040			6,000	300		
Mullet	5,000	250			12,000	600		
Shad	78,400	10,500	3,800	$850	37,100	8,250		
Sheepshead					10,000	400		
Spot	5,000	200			5,000	200		
Squeteagues or "sea trout," spotted	75,000	7,500			40,000	3,200		
Crabs, hard	459,200	6,888			562,000	8,910	360,000	$5,405
Shrimp	1,863,200	55,866			4,938,100	148,131		
Oysters, market:								
Private, spring	120,000	7,520			9,000	550	22,000	1,200
Private, fall	85,000	5,330			9,000	550	13,000	800
Terrapin, diamond back	6,000	950			13,700	2,165		
Total	2,789,300	97,139	3,800	850	5,701,900	175,976	395,000	7,405

Fisheries of Georgia, 1936—Continued

CATCH: BY COUNTIES—Continued

Species	Long		McIntosh		Screven		Tattnall		Wayne	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Catfish and bullheads			34,000	$1,530	1,000	$50			2,200	$100
Hickory shad			6,100	122					5,300	106
Shad	1,000	$203	12,300	2,725	7,500	1,422	3,700	$750	8,200	1,750
Sturgeon			9,000	470						
Crabs, hard			428,000	6,230						
Shrimp			1,373,000	41,190						
Oysters, market:										
Private, spring			57,200	4,056						
Private, fall			14,900	1,060						
Total	1,000	203	1,934,500	57,383	8,500	1,472	3,700	750	15,700	1,956

FLORIDA

Fisheries of Florida, 1936

OPERATING UNITS: BY GEAR

Item	Purse seines, menhaden	Haul seines	Gill nets				Trammel nets	Lines, hand
			Anchor	Drift	Run-around	Stake		
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	206	9	3					512
On boats and shore:								
Regular		1,047	32	164	2,586		556	935
Casual		134		17	29	14	10	1,111
Total	206	1,190	35	181	2,615	14	566	2,558
Vessels, motor	10	1	1					68
Net tonnage	629	11	12					2,180
Boats:								
Motor		275	14	63	1,053		226	654
Other		288	3	78	1,854	7	354	609
Accessory boats	22							
Apparatus:								
Number	10	296	20	102	2,077	7	434	2,606
Length, yards	2,960	157,225						
Square yards			34,450	144,600	1,917,305	5,300	294,600	
Hooks, baits, or snoods								3,098

Item	Lines—Continued				Pound nets	Fyke nets	Dip nets		Cast nets	Otter trawls, shrimp
	Trawl	Troll	Trot with baits or snoods	Trot with hooks			Common	Drop		
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels										457
On boats and shore:										
Regular	2	691	179	149	10	1	56	10	95	298
Casual		450	66	185			65	17	44	
Total	2	1,141	245	334	10	1	121	27	139	755
Vessels, motor										178
Net tonnage										1,411
Boats:										
Motor	1	594	44	49	8	1	16		3	147
Other		10	184	287	9		76	12	136	
Apparatus:										
Number	2	1,207	228	334	23	10	113	303	139	325
Yards at mouth										6,590
Hooks, baits, or snoods	180	1,337	98,200	105,725						

Fisheries of Florida, 1936—Continued

OPERATING UNITS: By gear—Continued

Item	Box traps	Pots				Spears	Dredges			Tongs, oyster
		Crab	Eel	Fish	Sea crawfish		Clam	Oyster	Scallop	
Fishermen:										
On boats and shore:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Regular	2	42	5	46	56	61	12	6	55	292
Casual		8		13		61			67	32
Total	2	50	5	59	56	122	12	6	122	324
Boats:										
Motor	1	27		10	28	8		3	50	86
Other		16	5	54		55	1			194
Apparatus:										
Number	300	4,821	73	3,490	1,140	122	1	3	74	324
Yards at mouth								3	82	

Item	Rakes, oyster	Forks	Grabs	Coquina scoops	Hooks		Diving outfits	By hand		Total, exclusive of duplication
					Sponge	Conch		Oysters	Other	
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels							30			1,211
On boats and shore:										
Regular	1	6	3		368	1	448	30	64	5,636
Casual		5		9		1		24	131	2,022
Total	1	11	3	9	368	2	478	54	195	8,869
Vessels, motor							3			259
Net tonnage							19			4,238
Boats:										
Motor			2				56	2		2,283
Other	1	8	1		254	2		35	17	3,538
Accessory boats										22
Apparatus, number	1	11	3	6	254	2	59			

CATCH: By gear

Species	Purse seines		Haul seines		Gill nets			
					Anchor		Drift	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives			231,500	$1,158				
Bluefish	500	$30	417,100	18,623			29,700	$1,638
Blue runner or hardtail			435,700	4,663				
Cabio or crab eater			1,600	32				
Catfish and bullheads			3,358,200	110,560				
Cigarfish			11,000	255				
Crappie			333,700	11,488				
Crevalle			65,500	1,065				
Croaker			15,500	304				
Drum:								
Black			64,100	1,422				
Red or redfish			278,000	9,148				
Flounders			43,400	1,576				
Groupers			32,600	1,333				
Hickory shad			37,000	770			5,000	150
Jewfish			8,100	144				
Kingfish or "king mackerel"			6,200	186				
King whiting or "kingfish"			178,100	4,175				
Menhaden	68,750,000	268,250	31,800	488				
Mojarra			91,400	2,310				
Moonfish			2,500	75				
Mullet			6,077,100	181,167				
Muttonfish			25,000	2,000				
Permit			4,200	82				

Fisheries of Florida, 1936—Continued

CATCH: By GEAR—Continued

Species	Purse seines		Haul seines		Gill nets			
					Anchor		Drift	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Pigfish			25,100	$497				
Pompano			85,900	19,712			1,100	$187
Porgies			1,000	20				
Sea catfish			600	12				
Shad			143,300	10,788	10,500	$1,260	118,200	13,275
Sharks					477,000	1,470		
Sheepshead			298,500	7,427				
Snapper, mangrove			46,600	1,461				
Snook or sergeantfish			155,400	6,692				
Spadefish			4,600	118				
Spanish mackerel			1,521,400	48,138			15,600	624
Spot			58,800	1,132				
Squeteagues or "sea trout":								
Spotted			673,600	41,160				
White			39,500	1,673				
Sturgeon							29,500	3,550
Sunfish			594,000	16,091				
Tenpounder			41,000	950				
Tripletail			37,300	560				
Turtles:								
Green					17,700	2,115		
Soft shell			46,600	725				
Total	68,750,500	$268,280	15,522,500	510,180	505,200	4,845	199,100	19,424

Species	Gill nets—Continued				Trammel nets		Lines, hand	
	Runaround		Stake					
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Angelfish					1,500	$45		
Bluefish	2,860,200	$150,967			65,200	2,203	303,200	$15,420
Blue runner or hardtail	124,000	2,305			37,800	569	1,000	40
Cabio or crab eater	1,000	20					3,300	91
Crevalle	117,700	2,239						
Croaker	24,500	540						
Drum:								
Black	85,100	1,871			500	10	47,100	1,319
Red or redfish	423,700	13,833			193,700	6,642	262,200	8,292
Flounders	19,100	733			25,600	882		
Groupers	25,000	837					4,741,900	137,536
Grunts							38,700	927
Hogfish	4,000	120					6,000	180
Jewfish	14,700	318					12,500	513
King whiting or "kingfish"	38,200	705			400	16	4,200	126
Menhaden	93,000	630						
Mojarra	230,100	4,953					14,300	366
Mullet	22,969,800	726,241			2,135,000	64,965		
Muttonfish	49,000	2,920					61,500	4,210
Permit	11,400	228			500	10		
Pigfish	40,300	817			4,400	132	1,400	28
Pinfish or sailors' choice	31,600	562					1,500	30
Pompano	209,400	45,847			406,000	80,937	11,300	2,630
Porgies	7,700	231					28,100	713
Sea bass							77,400	3,744
Sea catfish					100	2	2,100	42
Shad			10,500	$1,475				
Sheepshead	429,500	9,874			70,300	2,489	108,400	2,458
Snapper:								
Mangrove	64,900	2,402			6,400	223	122,300	5,473
Red	5,200	312					4,938,800	308,155
Snook or sergeantfish	142,600	5,170					282,800	10,834
Spadefish	8,000	161					1,600	96
Spanish mackerel	6,882,500	290,253			52,100	2,097	59,100	2,616
Spot	137,300	2,841			12,400	362		
Squeteagues or "sea trout":								
Spotted	1,647,600	106,211			462,600	31,735	1,393,500	90,391
White	32,200	1,444			2,300	92	15,100	594
Swellfish							800	40
Tenpounder	5,900	120						
Yellowtail							109,600	6,256
Total	36,735,200	1,375,705	10,500	1,475	3,476,800	193,411	12,649,700	603,120

Fisheries of Florida, 1936—Continued

CATCH: BY GEAR—Continued

Species	Lines—Continued							
	Trawl		Troll		Trot with baits or snoods		Trot with hooks	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Amberjack			13,400	$365				
Bluefish			106,000	5,450				
Catfish and bullheads							783,900	$30,311
Dolphin			5,000	100				
Eels, common							5,000	145
Groupers			2,900	87				
Kingfish or "king mackerel"			3,937,900	161,305				
King whiting or "kingfish"			1,000	20				
Sea catfish							94,900	1,898
Sharks	560,000	$1,800						
Snapper, red			300	24				
Snook or sergeantfish			15,500	532				
Spadefish			5,500	330				
Spanish mackerel			395,000	19,740				
Crabs, hard					2,520,000	$37,256		
Turtle, soft shell							53,000	915
Total	560,000	1,800	4,482,500	187,953	2,520,000	37,256	936,800	33,269

Species	Pound nets		Fyke nets		Dip nets			
					Common		Drop	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish	2,500	$125						
Catfish and bullheads	75,000	2,900	60,000	$2,100				
Drum, red, or redfish	2,600	97						
Jewfish	500	10						
Spanish mackerel	10,000	400						
Squeteagues or "sea trout," spotted	4,800	336						
Crabs, hard					28,400	$641	156,100	$2,859
Sea crawfish or spiny lobster					134,300	7,140		
Shrimp					8,200	1,350		
Turtles, green	1,000	60						
Total	96,400	3,928	60,000	2,100	170,900	9,131	156,100	2,859

Species	Cast nets		Otter trawls		Box traps		Pots	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders			204,600	$10,290				
King whiting or "kingfish"			1,634,600	27,397				
Mojarra	5,000	$200						
Mullet	179,800	5,909						
Crabs:								
Hard			87,000	1,740			357,500	$7,140
Stone							42,200	8,255
Sea crawfish or spiny lobster					20,000	$1,600	3,000	150
Shrimp	82,000	5,610	20,634,700	621,483				
Total	266,800	11,719	22,560,900	660,910	20,000	1,600	402,700	15,545

Fisheries of Florida, 1936—Continued

CATCH: BY GEAR—Continued

Species	Pots—Continued						Spears	
	Eel		Fish		Sea crawfish			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Catfish and bullheads			70,900	$2,415				
Crappie			129,300	4,270				
Eels, common	14,400	$437						
Flounders							61,600	$3,118
Groupers					59,800	$3,000		
Grunts					20,000	600		
Hogfish					3,000	90		
Jewfish					3,000	90		
Mojarra					11,300	340		
Muttonfish					30,000	2,400		
Sheepshead					8,000	240		
Snapper, mangrove					3,000	225		
Snook or sergeantfish					9,000	270		
Sunfish			83,400	2,820				
Sea crawfish or spiny lobster					150,000	9,650	19,300	1,550
Turtles, soft shell			300	6				
Total	14,400	437	283,900	9,511	297,100	16,905	80,900	4,668

Species	Dredges						Tongs	
	Clam		Oyster		Scallop			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Clams, hard, public	589,800	$36,860						
Oysters, market:								
Public, spring			202,400	$8,432			311,500	$22,028
Public, fall							436,900	32,602
Private, spring							141,300	7,551
Private, fall							95,400	3,361
Scallops, bay					251,100	$25,960		
Total	589,800	36,860	202,400	8,432	251,100	25,960	985,100	65,542

Species	Rakes		Forks		Grabs		Coquina scoops	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Clams:								
Coquina							4,300	$720
Hard, public			7,400	$777	8,800	$1,100		
Oysters, market:								
Public, spring	1,800	$150						
Public, fall	1,800	150						
Total	3,600	300	7,400	777	8,800	1,100	4,300	720

Species	Hooks				Diving outfits		By hand	
	Sponge		Conch					
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs, stone							2,600	$515
Clams, hard, public							28,200	2,443
Conch			7,800	$624				
Oysters, market:								
Public, spring							94,000	3,693
Public, fall							23,600	936
Private, spring							24,300	1,075
Private, fall							40,100	1,790
Scallops, bay							81,000	6,563
Sponges:								
Grass	22,800	$18,401						
Sheepswool	74,100	146,108			287,500	$853,667		
Wire					8,400	6,582		
Yellow	34,500	19,778			62,600	60,509		
Total	131,400	184,287	7,800	624	358,500	920,758	293,800	17,015

Fisheries of Florida, 1936—Continued

OPERATING UNITS: By COUNTIES

Item	Bay	Brevard	Broward	Charlotte	Citrus	Clay	Collier	Dade
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:								
On vessels	96							9
On boats and shore:								
Regular	202	153	23	157	149	44	260	242
Casual	42	33	60	33	32	14	124	155
Total	340	186	83	190	181	58	384	406
Vessels, motor	15							1
Net tonnage	247							11
Boats:								
Motor	54	71	40	58	62	10	125	166
Other	58	158	6	152	147	52	178	37
Apparatus:								
Haul seines	16		1	22		8	6	1
Length, yards	6,850		400	17,800		6,200	2,400	350
Gill nets:								
Anchor		1						
Square yards		1,000						
Runaround	16	93	6	132	128		176	55
Square yards	13,300	75,600	12,000	153,350	84,000		137,325	96,600
Trammel nets	2			12			34	
Square yards	1,400			17,800			58,800	
Lines:								
Hand	149	16	50	54	54		197	250
Hooks	298	16	50	54	54		197	250
Troll			22	14			57	247
Hooks			22	14			57	247
Trot with baits or snoods	2	47				32		
Baits or snoods	500	28,500				7,400		
Trot with hooks						32		
Hooks						8,700		
Dip nets, common	15	10						13
Cast nets				25				
Box traps			300					
Pots:								
Crab		2,670						270
Sea crawfish								1,140
Spears	13							16
Dredges:								
Clam							1	
Scallops	14							
Yards at mouth	14							
Tongs, oyster	57			2		26		

Item	Dixie	Duval	Escambia	Franklin	Glades	Gulf	Hendry	Hernando
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:								
On vessels		38	269	51		56		
On boats and shore:								
Regular	99	272	90	365	30	49	4	8
Casual	36	145	20	31		60	3	
Total	135	455	379	447	30	165	7	8
Vessels, motor		16	30	11		2		
Net tonnage		122	1,693	69		93		
Boats:								
Motor	30	104	34	170	19	37	3	2
Other	117	192	20	91	30	40	4	8
Accessory boats						6		
Apparatus:								
Purse seines, menhaden						2		
Length, yards						560		
Haul seines		15	1	12	10	6	1	
Length, yards		7,600	300	4,900	9,200	2,450	950	
Gill nets:								
Anchor		9						
Square yards		23,900						
Drift	12	39		4				
Square yards	14,000	90,000		1,600				
Runaround	74	15	10	41		11		8
Square yards	34,500	10,500	28,000	20,900		11,500		4,000
Trammel nets	72		20	2				
Square yards	33,000		18,000	500				
Lines:								
Hand	65	91	300	70		8		
Hooks	65	91	577	117		8		

Fisheries of Florida, 1936—Continued

OPERATING UNITS: By counties—Continued

Item	Dixie	Duval	Escambia	Franklin	Glades	Gulf	Hendry	Hernando
Apparatus—Continued								
Lines—Continued	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Troll	16	22		2				
Hooks	16	22		2				
Trot with baits or snoods		72		24				
Baits or snoods		30,800		8,600				
Trot with hooks		100		9	7	2	1	
Hooks		30,000		2,100	3,500	275	400	
Dip nets:								
Common				3				
Drop			15					
Cast nets		6						
Otter trawls, shrimp		27	19	69				
Yards at mouth		615	203	828				
Pots:								
Crab		20						
Fish				225	1,500		120	
Spears				20		24		
Dredges:								
Oyster				3				
Yards at mouth				3				
Scallop						49		
Yards at mouth						57		
Tongs, oyster	1	8		120		12		

Item	Hillsborough	Indian River	Lee	Levy	Manatee	Martin	Monroe	Nassau
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	66							260
On boats and shore:								
Regular	127	62	231	124	94	126	227	105
Casual		8	181	44	64		8	31
Total	193	70	412	168	158	126	235	396
Vessels, motor	10							54
Net tonnage	105							871
Boats:								
Motor	46	28	119	59	36	59	54	32
Other	114	69	222	128	96	50	160	58
Accessory boats								16
Apparatus:								
Purse seines, menhaden								8
Length, yards								2,400
Haul seines	2		10		22	10		7
Length, yards	600		2,800		6,050	10,000		2,100
Gill nets:								
Anchor						1	8	
Square yards						1,000	7,200	
Drift					8			17
Square yards					2,400			8,700
Runaround	113	28	199	94	86	36	25	3
Square yards	82,270	36,700	132,500	46,600	71,200	67,000	26,750	2,400
Stake								7
Square yards								5,300
Trammel nets	2		10	104	8		3	
Square yards	750		14,500	53,700	6,900		2,700	
Lines:								
Hand	79	32	154	74	51	58	38	
Hooks	79	32	154	74	51	58	38	
Trawl					2			
Hooks					180			
Troll			56	43	11	52	48	
Hooks			56	43	11	104	48	
Trot with baits or snoods	1	6	8	5				18
Baits or snoods	50	1,500	1,500	500				15,000
Dip nets:								
Common							34	
Drop			276					
Cast nets	28				8			
Otter trawls, shrimp								75
Yards at mouth								1,648
Pots, crab				250	100		52	
Dredges, scallop			10					
Yards at mouth			10					
Tongs, oyster	5	2		3				
Forks					9			
Coquina scoops			6					
Hooks:								
Sponge							140	
Conch							2	

Fisheries of Florida, 1936—Continued

OPERATING UNITS: BY COUNTIES—Continued

Item	Okaloosa	Okeechobee	Palm Beach	Pasco	Pinellas	Putnam	St. Johns	St. Lucie
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	14				51		287	3
On boats and shore:								
Regular	112	69	303	56	909	160	98	164
Casual	4	3	202	30	212		26	
Total	130	72	505	86	1,172	160	411	167
Vessels, motor	2				6		108	1
Net tonnage	28				66		893	5
Boats:								
Motor	25	32	218	15	217	66	24	82
Other	22	64	125	56	290	137	43	
Apparatus:								
Haul seines	12	9	2		22	38	15	
Length, yards	4,900	7,400	1,600		6,200	35,050	1,100	
Gill nets:								
Anchor					1			
Square yards					1,350			
Drift	2				8	12		
Square yards	600				18,300	9,000		
Runaround	5		109	56	184			82
Square yards	3,500		219,000	30,000	167,010			155,400
Trammel nets	17				7			
Square yards	12,000				4,350			
Lines:								
Hand	40		300	30	151		7	110
Hooks	59		300	30	151		7	110
Troll			191		218		4	110
Hooks			266		218		4	110
Trot with hooks		41				47		
Hooks		18,500				15,000		
Pound nets						22		
Fyke nets						10		
Dip nets, common			25					
Cast nets			32				3	
Otter trawls, shrimp							127	1
Yards at mouth							3,121	23
Pots:								
Crab					209			
Eel						73		
Fish		1,245	400					
Dredges, scallop					1			
Yards at mouth					1			
Tongs, oyster					14			
Grabs					3			
Hooks, sponge					88			
Diving outfits					59			

Item	Santa Rosa	Sarasota	Seminole	Taylor	Volusia	Wakulla	Walton
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels					11		
On boats and shore:							
Regular	17	137	45	83	109	124	7
Casual	10	58	95	22	51	179	6
Total	27	195	140	105	171	303	13
Vessels, motor					3		
Net tonnage					35		
Boats:							
Motor	7	89	10	11	17	47	5
Other	14	133	109	63	150	133	12
Apparatus:							
Haul seines		9	13		11	15	
Length, yards		2,680	6,150		6,515	4,680	
Gill nets, runaround		127		30	26	109	
Square yards		113,000		12,000	20,500	49,900	
Trammel nets	7	4		18		107	5
Square yards	3,100	9,000		7,200		48,300	2,600
Lines:							
Hand		58		35	32	53	
Hooks		58		35	32	53	
Troll		59		10		25	
Hooks		62		10		25	

Fisheries of Florida, 1936—Continued

OPERATING UNITS: By counties—Continued

Item	Santa Rosa	Sarasota	Seminole	Taylor	Volusia	Wakulla	Walton
Apparatus—Continued.							
Lines—Continued.	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Trot with baits or snoods					13		
Baits or snoods					3,850		
Trot with hooks			95				
Hooks			27,250				
Dip nets:							
Common					7	6	
Drop						12	
Cast nets					37		
Otter trawls, shrimp					7		
Yards at mouth					152		
Pots, crab						1,250	
Spears	6				25	12	6
Tongs, oyster	22	2			32	8	2
Rakes, oyster					1		
Forks		2					
Hooks, sponge				20			

CATCH: By counties

Species	Bay		Brevard		Broward		Charlotte	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish	155,500	$4,668	400	$24	16,000	$840	16,900	$676
Blue runner or hardtail	433,600	4,336					2,000	40
Cabio or crab eater							1,300	28
Cigarfish	7,000	175						
Crevalle			9,000	160				
Croaker							1,700	30
Drum:								
Black	100	3	16,400	317				
Red or redfish	6,500	195	37,700	1,414			84,800	2,120
Flounders	6,900	207					1,500	29
Groupers	1,491,300	43,406			5,000	250	8,700	207
Jewfish							1,500	35
Kingfish or "king mackerel"	6,000	180			75,000	4,500	6,400	304
King whiting or "kingfish"			3,600	62			5,900	124
Menhaden	2,000	50	85,000	550				
Mojarra							19,000	278
Mullet	1,124,400	33,672	1,288,700	37,960	352,000	7,060	2,150,400	64,512
Permit							2,400	46
Pigfish							3,800	76
Pinfish or sailors choice			16,600	312				
Pompano	10,400	1,430	12,400	2,575	14,000	2,520	25,000	5,000
Porgies	4,000	120						
Sharks			100,000	400				
Sheepshead	3,200	96	23,100	438			68,500	1,370
Snapper:								
Mangrove							31,100	775
Red	902,800	55,368						
Snook or sergeantfish			4,000	60			57,000	1,969
Spadefish	1,500	45						
Spanish mackerel	976,000	30,110			6,000	300	105,600	4,583
Spot	2,200	45	22,100	473			1,900	24
Squeteagues or "sea trout":								
Spotted	98,800	5,180	314,500	20,320			314,800	17,928
White							300	10
Tenpounder	14,000	350						
Tripletail							500	10
Crabs:								
Hard	13,400	181	707,200	14,144				
Stone							2,000	340
Sea crawfish or spiny lobster					20,000	1,600		
Clams, hard, public							800	100
Oysters, market:								
Public, spring	34,700	4,380					700	90
Public, fall	46,000	6,720					1,000	130
Scallops, bay	48,800	4,270						
Total	5,389,100	195,187	2,640,700	79,209	488,000	17,070	2,915,500	100,834

Fisheries of Florida, 1936—Continued

CATCH: BY COUNTIES—Continued

Species	Citrus		Clay		Collier		Dade	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish	16,900	$676			22,500	$1,125	36,000	$2,670
Blue runner or hardtail					400	8	26,000	780
Catfish and bullheads			76,000	$3,380				
Crappie			1,500	60				
Crevalle					7,500	150	6,200	186
Dolphin							5,000	100
Drum:								
Black							26,400	790
Red or redfish	87,400	2,969			115,900	3,710		
Flounders					4,200	120		
Groupers					28,200	640	159,800	8,000
Grunts							32,000	960
Hogfish							10,000	300
Jewfish							10,000	300
Kingfish or "king mackerel"					77,500	3,100	395,000	17,800
King whiting or "kingfish"					1,700	35		
Mojarra					34,100	682	51,300	1,540
Mullet	2,015,000	80,524			4,558,800	148,185	1,136,000	32,500
Muttonfish							84,000	6,720
Permit					9,200	184		
Pigfish	200	7			1,500	30		
Pompano	300	60			239,800	47,960	33,000	8,000
Shad			7,000	840				
Sheepshead	34,300	1,201			187,600	3,754	26,000	780
Snapper, mangrove	28,000	980			45,000	1,668	12,400	930
Snook or sergeantfish					207,700	8,066	27,000	810
Spadefish					5,200	105		
Spanish mackerel	300	15			970,900	44,578	621,000	31,000
Squeteagues or "sea trout":								
Spotted	268,000	18,510			438,700	28,364	27,000	1,890
White					500	30		
Sunfish			12,000	480				
Yellowtail							10,000	300
Crabs:								
Hard			215,000	3,170				
Stone							10,000	3,000
Sea crawfish or spiny lobster							188,600	12,550
Clams, hard, public					589,800	36,860		
Oysters, market:								
Public, spring	40,800	1,910						
Public, fall	25,900	1,300						
Private, spring	20,400	956						
Private, fall	2,400	118						
Total	2,539,900	109,226	311,500	7,930	7,546,700	329,354	2,932,700	131,906

Species	Dixie		Duval		Escambia		Franklin	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish	10,100	$374	1,700	$100	62,100	$1,242	11,600	$389
Blue runner or hardtail					4,700	71		
Catfish and bullheads			145,000	5,540			29,800	1,192
Crevalle			7,000	280				
Croaker			2,500	100				
Drum:								
Black			3,000	150	500	10		
Red or redfish	78,500	2,728	11,200	745	7,500	225	31,600	949
Flounders	9,600	288	56,300	2,825	300	9	9,700	299
Groupers	200	7	8,400	328	1,642,800	43,124	560,100	16,201
Kingfish or "king mackerel"	21,000	735	40,000	2,400			1,000	20
King whiting or "kingfish"			272,300	4,021	400	16	500	15
Menhaden							3,000	90
Mullet	709,000	24,810	234,700	9,350	270,400	8,112	1,417,100	42,513
Pigfish	5,200	156						
Pompano	2,500	476	4,100	680	33,900	6,780	4,100	615
Porgies					4,000	120	1,500	45
Sea bass			61,000	2,760				
Sea catfish					2,500	50	91,400	1,828
Shad			74,700	8,960				
Sheepshead	13,900	490			2,000	60	6,800	204
Snapper:								
Mangrove	3,600	125						
Red			65,500	4,588	2,863,200	172,272	482,700	32,302
Spanish mackerel	24,500	1,176	27,400	1,970	353,000	9,225	60,900	2,436
Spot	8,500	255	5,000	225	2,500	50	4,700	120
Squeteagues or "sea trout":								
Spotted	369,000	25,830	71,500	5,870	17,000	1,190	79,600	4,459
White					2,000	80		

Fisheries of Florida, 1936—Continued

CATCH: BY COUNTIES—Continued

Species	Dixie		Duval		Escambia		Franklin	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Sturgeon	21,000	$2,310					3,500	$740
Tenpounder							6,000	180
Crabs, hard			989,000	$12,640	3,000	$108	375,700	3,779
Shrimp			2,015,700	60,498	36,000	1,440	1,753,000	52,590
Oysters, market:								
Public, spring	800	37	1,500	75	2,800	200	349,700	17,906
Public, fall					3,600	300	263,400	18,520
Private, spring			3,800	170				
Private, fall			6,100	275				
Sponges:								
Grass	1,000	990						
Sheepswool	1,700	4,632						
Yellow	900	833						
Total	1,281,000	66,252	4,107,400	124,550	5,314,400	244,684	5,547,400	197,392

Species	Glades		Gulf		Hendry		Hernando	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish			72,500	$1,817			2,000	$100
Catfish and bullheads	542,900	$12,388			49,000	$1,260		
Crappie	151,100	3,653			5,000	123		
Drum, red or redfish			1,200	36			3,000	90
Flounders			6,300	189				
Kingfish or "king mackerel"			200	6				
Menhaden			3,380,000	6,760				
Mullet			631,000	18,930			100,000	3,000
Pompano			4,900	882				
Sea catfish			3,500	70				
Sheepshead			1,900	48			1,500	45
Snapper, mangrove							1,000	30
Spanish mackerel			215,500	7,542				
Squeteagues or "sea trout," spotted			44,000	2,640			2,500	150
Sunfish	144,700	3,533			25,000	573		
Oysters, market:								
Public, spring			7,500	480				
Public, fall			24,000	1,500				
Scallops, bay			134,400	15,280				
Turtles, soft shell	24,000	480			9,000	135		
Total	862,700	20,054	4,526,900	56,180	88,000	2,091	110,000	3,415

Species	Hillsborough		Indian River		Lee		Levy	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Angelfish							1,500	$45
Bluefish			90,700	$5,310	24,600	$1,230	10,100	501
Blue runner or hardtail					5,600	112	2,300	72
Cabio or crab eater					2,600	52	1,000	35
Crevalle	1,000	$10	10,000	150	3,400	68		
Croaker					2,100	42		
Drum:								
Black	1,500	15	22,000	390	700	14	2,500	50
Red or redfish	49,000	1,715	37,200	1,116	134,700	4,041	52,600	1,797
Flounders	100	6			4,000	80	3,100	109
Groupers	263,500	9,361	2,500	100	33,000	812	2,300	81
Jewfish					4,100	100	500	10
Kingfish or "king mackerel"					58,000	2,320	80,300	3,613
King whiting or "kingfish"			10,000	150	7,700	154		
Mojarra			4,000	120	53,500	1,070		
Mullet	613,000	21,360	700,500	13,960	3,748,200	113,384	905,500	31,642
Permit					4,500	90		
Pigfish					7,300	146		
Pinfish or sailors choice			10,000	150				
Pompano	2,700	488	10,000	2,066	26,400	5,280	7,700	1,540
Sheepshead	25,500	765	9,200	198	164,500	3,289	28,900	1,011
Snapper:								
Mangrove	1,000	50			49,400	1,482	4,800	167
Red	282,000	20,457	5,200	312			2,000	120
Snook or sergeantfish	6,000	201	14,000	600	103,400	4,136		
Spadefish					4,800	96		
Spanish mackerel	20,500	820	71,600	2,448	146,700	7,335	14,600	650
Spot	24,000	240	22,000	510	1,700	18		

Fisheries of Florida, 1936—Continued

CATCH: BY COUNTIES—Continued

Species	Hillsborough		Indian River		Lee		Levy	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Squeteagues or "sea trout":								
Spotted	51,400	$3,568	176,300	$10,560	410,600	$27,420	235,800	$16,506
White	6,300	220			1,000	49		
Crabs:								
Hard	11,200	220	36,000	360	400,100	7,002	12,500	250
Stone							3,800	500
Clams, coquina					4,300	720		
Oysters, market:								
Public, spring			7,600	1,600			2,100	131
Public, fall							300	19
Private, spring	4,000	600						
Private, fall	1,300	200						
Scallops, bay					67,000	6,285		
Turtles, green							1,000	60
Total	1,364,000	60,296	1,238,800	40,100	5,473,900	186,827	1,375,200	58,909

Species	Manatee		Martin		Monroe		Nassau	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish	19,300	$772	695,300	$45,470	4,900	$395	900	$54
Blue runner or hardtail	2,200	44			7,000	70		
Cabio or crab eater	200	6						
Crevalle	8,500	155	77,700	1,240				
Croaker	700	17	27,000	540				
Drum:								
Black	5,000	170	74,000	1,520			900	36
Red or redfish	20,000	605	32,800	746	14,600	438	1,100	55
Flounders	1,300	30	10,400	520			54,600	2,811
Groupers	15,000	400	20,000	1,000	58,600	2,344		
Grunts					23,000	460		
Hogfish					3,000	90		
Jewfish			13,800	207	3,900	273		
Kingfish or "king mackerel"	11,700	321	23,000	1,030	442,000	17,680		
King whiting or "kingfish"	400	10					504,600	9,054
Menhaden			26,800	268			65,370,000	261,490
Mojarra	8,600	178	88,300	1,760				
Mullet	1,134,700	33,082	559,900	11,415	62,400	1,875	7,600	304
Muttonfish			25,000	2,000	21,000	1,260		
Pigfish	500	5	44,000	880				
Pompano	29,300	5,506	93,600	22,860	4,000	1,000		
Porgies	600	18			9,000	180		
Shad							27,500	4,025
Sharks	560,000	1,800	80,000	320	297,000	750		
Sheepshead	65,500	1,965	44,800	896	3,000	60		
Snapper, mangrove	2,200	57	4,000	200	44,200	2,652		
Snook or sergeantfish	9,500	306	95,800	4,370				
Spadefish	1,100	33						
Spanish mackerel	129,400	6,076	62,100	2,955	215,000	9,675		
Spot	5,000	50	31,000	620			9,300	372
Squeteagues or "sea trout":								
Spotted	177,900	11,084	24,500	1,702			17,800	1,246
White	54,400	2,216						
Tripletail			36,800	550				
Yellowtail					86,600	5,196		
Crabs:								
Hard							243,000	4,860
Stone	1,100	190			7,100	600		
Sea crawfish or spiny lobster					116,000	5,800		
Shrimp							5,666,500	170,415
Clams, hard, public	6,000	650						
Conchs					7,800	624		
Oysters, market:								
Private, spring							21,900	985
Private, fall							39,100	1,750
Scallops, bay	6,800	478						
Turtles, green					6,000	360		
Sponges:								
Grass					5,400	1,147		
Sheepswool					43,900	58,021		
Yellow					20,600	6,448		
Total	2,276,900	66,224	2,190,600	103,069	1,506,000	117,398	71,964,800	457,457

Fisheries of Florida, 1936—Continued

CATCH: BY COUNTIES—Continued

Species	Okaloosa		Okeechobee		Palm Beach		Pasco	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish	64,500	$1,935			1,365,200	$69,174	11,500	$575
Blue runner or hardtail	72,000	1,110			32,200	640		
Catfish and bullheads			1,094,200	$43,800	28,000	840		
Cigarfish	4,000	80						
Crappie			111,000	4,160	35,000	1,050		
Crevalle					10,900	255		
Croaker					5,000	100		
Drum:								
Black	800	20			6,500	130		
Red or redfish	3,000	90			11,100	290	8,000	280
Flounders	6,100	148						
Groupers	290,600	8,518			23,400	795	2,500	87
Grunts					2,300	79		
Jewfish					5,000	150		
Kingfish or "king mackerel"					2,336,000	93,460		
King whiting or "kingfish"					5,000	100		
Menhaden	8,000	160						
Mojarra					71,300	2,176		
Moonfish					2,500	75		
Mullet	844,000	17,965			91,000	2,730	707,300	21,219
Muttonfish					35,500	1,550		
Pinfish or sailors choice					6,500	130		
Pompano	43,000	8,600			71,700	16,013	100	20
Porgies	5,000	150						
Sea catfish	300	6						
Sheepshead	2,000	60			17,100	402	6,000	210
Snapper:								
Mangrove					1,700	93	4,700	165
Red	208,700	12,882						
Snook or sergeantfish					33,300	1,395		
Spanish mackerel	883,900	26,517			1,662,300	58,600	7,900	375
Squeteagues or "sea trout," spotted	5,700	399			11,100	770	67,600	4,056
Sturgeon	5,000	500						
Sunfish			89,200	3,360				
Swellfish					800	40		
Tenpounder	21,000	420						
Yellowtail					1,000	40		
Sea crawfish or spiny lobster					2,000	140		
Turtles, soft shell			45,000	675	300	6		
Total	2,467,600	79,560	1,339,400	51,995	5,873,700	251,223	815,600	26,987

Species	Pinellas		Putnam		St. Johns		St. Lucie	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives			231,500	$1,158				
Amberjack	13,400	$365						
Bluefish	75,700	4,281			17,000	$1,020	935,500	$46,800
Blue runner or hardtail	700	21					2,500	37
Cabio or crab eater	800	22						
Catfish and bullheads			1,783,900	62,066				
Crappie			129,400	5,512				
Crevalle							37,000	550
Drum:								
Black					25,000	750	2,500	37
Red or redfish	51,500	1,793			39,200	1,568	21,300	640
Eels, common			19,400	582				
Flounders	8,700	342			94,600	4,755	1,100	55
Groupers	208,500	5,802					15,300	605
Grunts					1,400	28		
Hickory shad			42,000	920				
Kingfish or "king mackerel"	191,400	6,802			4,200	100	68,900	3,440
King whiting or "kingfish"					963,100	16,524	9,900	148
Mojarra							15,000	225
Mullet	1,613,800	55,869	1,100	33	158,000	5,590	364,000	7,280
Pigfish					1,400	28	2,500	37
Pompano	10,800	2,212			3,000	750	6,800	1,350
Porgies	7,700	231						
Sea bass					1,400	84		
Shad			167,600	12,726				
Sheepshead	51,800	1,999			3,500	105	2,500	38
Snapper:								
Mangrove	6,200	299						
Red	62,700	4,220					9,500	570
Snook or sergeantfish	4,000	150					23,100	925
Spadefish	7,100	426						

Fisheries of Florida, 1936—Continued

CATCH: BY COUNTIES—Continued

Species	Pinellas		Putnam		St. Johns		St. Lucie	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Spanish mackerel	673,000	$34,495			4,900	$245	1,304,600	$65,200
Spot	1,000	10	200	$8			37,000	555
Squeteagues or "sea trout":								
Spotted	361,500	23,098			16,200	1,134	55,400	2,725
White	15,300	916						
Sunfish			289,200	7,967				
Tenpounder	5,900	120						
Yellowtail	12,000	720						
Crabs, stone	6,000	1,400						
Shrimp					10,659,800	321,432	113,800	3,411
Clams, hard, public	8,800	1,100			27,400	2,343		
Oysters, market:								
Public, spring					94,000	3,693		
Public, fall					23,600	936		
Private, spring	15,300	595			2,400	90		
Private, fall	20,300	790			1,000	40		
Scallops, bay	65,900	5,433						
Turtles:								
Green	11,700	1,755						
Soft shell			16,600	300				
Sponges:								
Grass	11,400	11,314						
Sheepswool	307,500	911,962						
Wire	8,400	6,582						
Yellow	71,400	68,940						
Total	3,910,200	1,154,064	2,680,900	91,272	12,141,100	361,215	3,028,200	134,628

Species	Santa Rosa		Sarasota		Seminole		Taylor	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish			700	$35			10,200	$510
Blue runner or hardtail	300	$6	7,000	230				
Catfish and bullheads					284,000	$9,940		
Crappie					14,800	590		
Croaker			1,000	15				
Drum, red, or redfish	800	24	68,800	2,034			12,500	436
Flounders	1,600	48	8,000	305			2,600	90
Groupers			3,500	85			2,000	70
Kingfish or "king mackerel"			79,500	2,930			15,000	450
King whiting or "kingfish"			3,500	70				
Mojarra			7,000	140				
Mullet	160,000	4,800	1,050,700	31,521			385,000	13,325
Pigfish			3,500	70			1,300	39
Pompano			6,900	1,380			900	180
Porgies			5,000	100				
Shad					5,200	213		
Sheepshead	500	15	81,000	1,620			4,000	139
Snapper, mangrove			3,900	111				
Snook or sergeantfish			20,500	510				
Spanish mackerel			344,000	13,760			10,000	500
Spot			5,000	50			1,000	34
Squeteagues or "sea trout":								
Spotted	2,500	175	169,100	9,896			127,000	8,320
White	300	12	9,000	270				
Sunfish					35,600	968		
Crabs, stone			600	175				
Clams, hard, public			1,400	127				
Oysters, market:								
Public, spring	11,900	1,604	1,000	50				
Public, fall	10,900	1,650	1,500	75				
Scallops, bay			9,200	777				
Sponges:								
Grass							5,000	4,950
Sheepswool							8,500	25,160
Yellow							4,200	4,066
Total	188,800	8,334	1,891,300	66,336	339,600	11,711	589,200	58,269

Fisheries of Florida, 1936—Continued

CATCH: By counties—Continued

Species	Volusia		Wakulla		Walton	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish	17,500	$1,050	16,600	$643		
Catfish and bullheads	315,200	7,880				
Crappie	15,200	610				
Crevalle	5,000	100				
Drum:						
Black	9,000	220				
Red or redfish	41,100	1,850	94,500	3,275	1,100	$38
Flounders	43,600	2,580	18,300	701	1,400	53
Groupers	6,000	240	11,000	330		
Kingfish or "king mackerel"			12,000	300		
King whiting or "kingfish"	67,900	1,956				
Mullet	371,500	10,115	1,811,000	66,660	85,000	3,025
Pompano	11,000	2,820	1,400	270		
Sea bass	15,000	900				
Shad	500	34				
Sheepshead	5,000	100	31,000	1,127	100	3
Snapper, red	60,000	5,400				
Spanish mackerel			24,100	1,282		
Spot	20,000	530	4,400	146		
Squeteagues or "sea trout," spotted	73,500	4,150	132,800	9,293	20,000	1,400
Sunfish	81,700	2,030				
Crabs:						
Hard	138,000	2,760	4,900	162		
Stone			14,200	2,565		
Shrimp	480,100	18,657				
Oysters, market:						
Public, spring	44,500	1,350	7,700	437	2,400	360
Public, fall	47,400	1,505	13,500	853	1,200	180
Private, spring	97,800	5,230				
Private, fall	65,300	1,978				
Turtles, soft shell	5,000	50				
Total	2,036,800	74,095	2,197,400	88,044	111,200	5,059

CATCH: By districts

Species	East coast		West coast		Lake Okeechobee	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Alewives	231,500	$1,158				
Amberjack			13,400	$365		
Angelfish			1,500	45		
Bluefish	3,176,200	172,512	608,200	21,944		
Blue runner or hardtail	60,700	1,457	537,800	6,120		
Cabio or crab eater			5,900	143		
Catfish and bullheads	2,604,100	88,806	29,800	1,192	1,714,100	$58,288
Cigarfish			11,000	255		
Crappie	160,900	6,772			302,100	8,986
Crevalle	162,800	2,921	20,400	383		
Croaker	34,500	740	5,500	104		
Dolphin	5,000	100				
Drum:						
Black	185,700	4,340	11,100	282		
Red or redfish	232,700	8,424	927,500	29,588		
Eels, common	19,400	582				
Flounders	260,600	13,546	93,700	3,053		
Groupers	240,400	11,318	4,621,800	131,475		
Grunts	35,700	1,067	23,000	460		
Hickory shad	42,000	920				
Hogfish	10,000	300	3,000	90		
Jewfish	28,800	657	10,000	418		
Kingfish or "king mackerel"	2,942,100	122,730	1,002,000	38,761		
King whiting or "kingfish"	1,836,400	32,015	20,100	424		
Menhaden	65,481,800	262,308	3,393,000	7,060		
Mojarra	229,900	5,821	122,200	2,348		
Moonfish	2,500	75				
Mullet	5,265,000	138,297	26,096,700	839,985		
Muttonfish	144,500	10,270	21,000	1,260		
Permit			16,100	320		
Pigfish	47,900	945	23,300	529		
Pinfish or sailors choice	33,100	592				
Pompano	259,600	59,634	454,100	89,679		
Porgies			36,800	964		
Sea bass	77,400	3,744				
Sea catfish			97,700	1,954		
Shad	282,500	26,798				
Sharks	180,000	720	857,000	2,550		

Fisheries of Florida, 1936—Continued

CATCH: BY DISTRICTS—Continued

Species	East coast		West coast		Lake Okeechobee	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Sheepshead	131,200	$2,957	783,500	$19,531		
Snapper:						
Mangrove	18,100	1,223	225,100	8,561		
Red	140,200	10,870	4,804,100	297,621		
Snook or sergeantfish	197,200	8,160	408,100	15,338		
Spadefish			19,700	705		
Spanish mackerel	3,759,900	162,718	5,175,800	201,150		
Spot	146,600	3,293	61,900	1,042		
Squeteagues or "sea trout":						
Spotted	787,800	50,367	3,394,300	219,466		
White			89,100	3,803		
Sturgeon			29,500	3,550		
Sunfish	418,500	11,445			258,900	$7,466
Swellfish	800	40				
Tenpounder			46,900	1,070		
Tripletail	36,800	550	500	10		
Yellowtail	11,000	340	98,600	5,916		
Crabs:						
Hard	2,355,600	40,277	820,800	11,702		
Stone	10,000	3,000	34,800	5,770		
Sea crawfish or spiny lobster	210,600	14,290	116,000	5,800		
Shrimp	18,935,900	574,413	1,789,000	54,030		
Clams:						
Coquina			4,300	720		
Hard, public			606,800	38,837		
Conchs			7,800	624		
Oysters, market:						
Public, spring	147,600	6,718	462,100	27,585		
Public, fall	71,000	2,441	391,300	31,247		
Private, spring	125,900	6,475	39,700	2,151		
Private, fall	111,500	4,043	24,000	1,108		
Scallops, bay			332,100	32,523		
Turtles:						
Green			18,700	2,175		
Soft shell	21,600	350			78,300	1,296
Sponges:						
Grass			22,800	18,401		
Sheepswool			361,600	999,775		
Wire			8,400	6,582		
Yellow			97,100	80,287		
Total	111,911,500	1,883,539	59,338,000	3,278,831	2,353,400	76,036

Sponge Fishery of Florida, 1936

OPERATING UNITS: BY GEAR

Item	Sponge hooks	Diving outfits	Total
Fishermen:	*Number*	*Number*	*Number*
On vessels		30	30
On boats and shore, regular	368	448	816
Total	368	478	846
Vessels, motor		3	3
Net tonnage		19	19
Boats:			
Motor		56	56
Other	254		254
Apparatus, number	254	59	313

CATCH: BY GEAR

Sponges	Sponge hooks		Diving outfits		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Grass	22,800	$18,401			22,800	$18,401
Sheepswool	74,100	146,108	287,500	$853,667	361,600	999,775
Wire			8,400	6,582	8,400	6,582
Yellow	34,500	19,778	62,600	60,509	97,100	80,287
Total	131,400	184,287	358,500	920,758	489,900	1,105,045

SPONGES SOLD AT THE EXCHANGE, TARPON SPRINGS, FLA.

During 1936 sponges sold on the exchange at Tarpon Springs, Fla., amounted to 418,839 pounds, valued at $1,035,429. This is an increase of 8 percent in quantity and 67 percent in value as compared with the transactions during 1935. Of the total sponges sold on the exchange during 1936, 92,816 pounds, valued at $371,994, were large wool; 26,572 pounds, valued at $67,156, were medium and small wool; 197,152 pounds, valued at $498,604, were wool rags; 76,470 pounds, valued at $73,839, were yellow; 17,423 pounds, valued at $17,254, were grass; and 8,406 pounds, valued at $6,582, were wire. It is estimated that sponges valued at $4,000 were sold outside of the exchange.

ALABAMA

Fisheries of Alabama, 1936

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets		Trammel nets	Lines		
		Run-around	Stake		Hand	Trot with baits or snoods	Trot with hooks
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels					66		
On boats and shore:							
Regular	36	15	3	163	20	63	33
Casual			2	11	17	25	
Total	36	15	5	174	103	88	33
Vessels, motor					9		
Net tonnage					114		
Boats:							
Motor	6	5	1	53	9	27	3
Other	7	7	4	130	18	49	33
Apparatus:							
Number	6	7	8	131	103	95	84
Length, yards	4,500						
Square yards		5,400	2,000	45,200			
Hooks, baits, or snoods					169	32,950	25,500

Item	Fyke nets	Otter trawls, shrimp	Pots, fish	Spears	Dredges, oyster	Tongs, oyster	By hand, other than for oysters	Total, exclusive of duplication
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels		55			21	6		132
On boats and shore:								
Regular	2	262	17	19	8	201	15	644
Casual				30		25	19	102
Total	2	317	17	49	29	232	34	878
Vessels, motor		26			6	3		38
Net tonnage		269			98	25		414
Boats:								
Motor	2	131	3		4	70		268
Other			16	2		93		281
Apparatus:								
Number	12	157	65	49	13	227		
Yards at mouth		1,898			13			

Fisheries of Alabama, 1936—Continued

CATCH: BY GEAR

Species	Haul seines		Gill nets				Trammel nets	
			Runaround		Stake			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bluefish	66,900	$3,134	1,100	$44			4,000	$200
Blue runner or hardtail	16,700	490						
Buffalofish							13,000	520
Catfish and bullheads							1,000	60
Croaker	2,700	54					14,100	282
Drum:								
Black	1,700	42					200	5
Red or redfish	12,800	819	1,300	91			15,300	1,085
Flounders	1,100	88	500	35			10,100	773
King whiting or "kingfish"	200	6					800	24
Mullet	931,700	26,951	38,000	1,140			2,616,300	83,347
Pompano	1,400	280					5,200	1,040
Sea catfish	800	16					900	28
Sheepshead, salt water	8,200	313					14,700	669
Spanish mackerel	27,700	1,565	45,000	3,150			200	10
Spot							800	16
Squeteagues or "sea trout":								
Spotted	26,500	2,117	7,900	553			61,900	4,861
White	3,000	90					7,200	216
Sturgeon					1,600	$112		
Tenpounder	9,000	224						
Total	1,110,400	36,189	93,800	5,013	1,600	112	2,765,700	93,136

Species	Lines						Fyke nets		Otter trawls	
	Hand		Trot with baits or snoods		Trot with hooks					
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Buffalofish					22,700	$908	8,000	$320		
Catfish and bullheads	3,000	$180			55,000	3,300	4,000	240		
Croaker	700	14								
Drum, red or redfish	4,400	289								
Groupers	196,400	6,728								
Paddlefish or spoonbill cat					13,700	822				
Sea catfish	800	28			5,500	192				
Sheepshead:										
Fresh water							1,400	84		
Salt water	1,400	57								
Snapper, red	1,027,500	61,650								
Squeteagues or "sea trout":										
Spotted	9,500	783								
White	2,100	63								
Crabs, hard			997,200	$14,352						
Shrimp									1,868,700	$65,296
Total	1,245,800	69,792	997,200	14,352	96,900	5,222	13,400	644	1,868,700	65,296

Species	Pots		Spears		Dredges		Tongs		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Catfish and bullheads	38,500	$2,310								
Flounders			25,200	$1,986						
Crabs, soft and peelers									600	$200
Oysters, market:										
Public, spring					128,700	$6,435	561,400	$30,367		
Public, fall					40,500	2,225	230,400	19,110		
Private, spring							10,500	875		
Private, fall							20,300	1,875		
Terrapin, diamond back									3,200	320
Total	38,500	2,310	25,200	1,986	169,200	8,660	822,600	52,227	3,800	520

Fisheries of Alabama, 1936—Continued

OPERATING UNITS: By counties

Item	Baldwin	Mobile	Item	Baldwin	Mobile
	Number	*Number*		*Number*	*Number*
Fishermen:			Apparatus—Continued		
On vessels	10	122	Trammel nets	50	81
On boats and shore:			Square yards	16,600	28,600
Regular	139	505	Lines:		
Casual	23	79	Hand	4	99
			Hooks	4	165
Total	172	706	Trot with baits or snoods	1	94
Vessels, motor	5	33	Baits or snoods	200	32,750
Net tonnage	43	371	Trot with hooks	34	50
Boats:			Hooks	11,500	14,000
Motor	53	215	Fyke nets		12
Other	79	202	Otter trawl, shrimp	14	143
Apparatus:			Yards at mouth	169	1,729
Haul seines	1	5	Pots, fish	12	53
Length, yards	1,000	3,500	Spears	13	36
Gill nets:			Dredges, oyster	5	8
Runaround	7		Yards at mouth	5	8
Square yards	5,400		Tongs, oyster	35	192
Stake	8				
Square yards	2,000				

CATCH: By counties

Species	Baldwin		Mobile	
	Pounds	*Value*	*Pounds*	*Value*
Bluefish	1,300	$50	70,700	$3,328
Blue runner or hardtail	600	18	16,100	472
Buffalofish	10,700	428	33,000	1,320
Catfish and bullheads	30,500	1,830	71,000	4,260
Croaker	7,000	140	10,500	210
Drum:				
Black	1,100	27	800	20
Red or redfish	12,800	886	21,000	1,398
Flounders	12,700	946	24,200	1,936
Groupers			196,400	6,728
King whiting or "kingfish"			1,000	30
Mullets	773,100	23,193	2,812,900	88,245
Paddlefish or spoonbill cat	7,700	462	6,000	360
Pompano	5,100	1,020	1,500	300
Sea catfish	2,000	70	6,000	194
Sheepshead:				
Fresh water			1,400	84
Salt water	7,200	273	17,100	766
Snapper, red			1,027,500	61,650
Spanish mackerel	49,800	3,534	23,100	1,191
Spot	200	4	600	12
Squeteagues or "sea trout":				
Spotted	40,400	2,908	65,400	5,406
White			12,300	369
Sturgeon	1,600	112		
Tenpounder	1,100	27	7,900	197
Crabs:				
Hard	3,600	120	993,600	14,232
Soft and peelers			600	200
Shrimp	195,100	6,827	1,673,600	58,469
Oysters, market:				
Public, spring	25,900	1,860	664,200	34,942
Public, fall	82,300	6,065	188,600	15,270
Private, spring	10,500	875		
Private, fall	20,300	1,875		
Terrapin, diamond back	2,000	200	1,200	120
Total	1,304,600	53,750	7,948,200	301,709

MISSISSIPPI

Fisheries of Mississippi, 1936

OPERATING UNITS: By GEAR

Item	Haul seines	Trammel nets	Lines		Dip nets, drop	Cast nets
			Hand	Trot with baits or snoods		
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels			24			
On boats and shore:						
Regular	38	60	75	191		3
Casual	2		74	31	11	78
Total	40	60	173	222	11	81
Vessels, motor			4			
Net tonnage			48			
Boats:						
Motor	9	22	9	43		
Other	1	43	102	135	7	2
Apparatus:						
Number	9	44	173	172	75	81
Length, yards	2,350					
Square yards		8,650				
Hooks, baits, or snoods			199	68,037		

Item	Otter trawls, shrimp	Spears	Dredges, oyster	Tongs, oyster	By hand, other than for oysters	Total, exclusive of duplication
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	320		512			686
On boats and shore:						
Regular	808	4	68	441		1,209
Casual		64		31	24	201
Total	1,128	68	580	472	24	2,096
Vessels:						
Motor	159		116			195
Net tonnage	1,796		1,641			2,397
Sail			12			12
Net tonnage			164			164
Total vessels	159		128			207
Total net tonnage	1,796		1,805			2,561
Boats:						
Motor	404		17	52		483
Other				417		503
Apparatus:						
Number	563	68	290	472		
Yards at mouth	7,228		290			

Fisheries of Mississippi, 1936—Continued

CATCH: BY GEAR

Species	Haul seines		Trammel nets		Lines			
					Hand		Trot with baits or snoods	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Croaker	300	$9	5,600	$168	5,600	$168		
Drum:								
Black	900	27	5,800	174	1,600	48		
Red or redfish	1,000	50	72,400	3,600	14,200	705		
Flounders	400	32	3,400	270				
Groupers					150,000	4,500		
King whiting or "kingfish"			3,100	93	2,000	60		
Mullet	10,000	300	320,500	9,615				
Pompano			800	120				
Sea catfish			14,300	286	11,800	236		
Sheepshead			22,700	913	1,700	69		
Snapper, red					324,900	19,494		
Squeteagues or "sea trout":								
Spotted	4,000	320	115,500	9,150	60,100	4,798		
White	7,500	225	54,600	1,738	51,500	1,645		
Tripletail					200	8		
Crabs, hard							1,997,900	$30,254
Shrimp:								
Mississippi	2,000	120						
Louisiana	500,000	13,500						
Total	526,100	14,583	618,700	26,127	623,600	31,731	1,997,900	30,254

Species	Dip nets, drop		Cast nets		Otter trawls		Spears	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders					5,000	$400	22,100	$1,760
Mullet			24,000	$720				
Crabs, hard	13,100	$222						
Shrimp:								
Mississippi			1,000	60	1,741,800	47,510		
Louisiana					15,248,300	410,399		
Total	13,100	222	25,000	780	16,995,100	458,309	22,100	1,760

Species	Dredges		Tongs		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs, soft and peelers					2,700	$518
Oysters, market:						
Public, spring, Mississippi	589,800	$36,749	937,800	$59,312		
Public, fall, Mississippi			177,400	17,037		
Public, spring, Louisiana	3,952,200	242,219	57,000	2,660		
Public, fall, Louisiana	44,100	2,759	12,600	1,125		
Total	4,586,100	281,727	1,184,800	80,134	2,700	518

Fisheries of Mississippi, 1936—Continued

OPERATING UNITS: By counties

Item	Hancock	Harrison	Jackson
Fishermen:	*Number*	*Number*	*Number*
On vessels	22	645	19
On boats and shore:			
Regular	92	967	150
Casual	31	133	37
Total	145	1,745	206
Vessels:			
Motor	2	188	5
Net tonnage	27	2,296	74
Sail	4	8	----
Net tonnage	53	111	----
Total vessels	6	196	5
Total net tonnage	80	2,407	74
Boats:			
Motor	30	390	63
Other	54	355	94
Apparatus:			
Haul seines	----	6	3
Length, yards	----	1,950	400
Trammel nets	4	15	25
Square yards	1,100	3,150	4,400
Lines:			
Hand	23	99	51
Hooks	23	110	66
Trot with baits or snoods	----	155	17
Baits or snoods	----	49,587	18,450
Dip nets, drop	60	15	----
Cast nets	10	60	11
Otter trawls, shrimp	24	493	46
Yards at mouth	294	6,372	562
Spears	10	42	16
Dredges, oyster	16	274	----
Yards at mouth	16	274	----
Tongs, oyster	51	340	81

CATCH: By counties

Species	Hancock		Harrison		Jackson	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Croaker	2,000	$60	6,300	$189	3,200	$96
Drum:						
Black	1,900	57	4,100	123	2,300	69
Red or redfish	14,400	720	40,800	2,040	32,400	1,595
Flounders	3,000	240	21,900	1,752	6,000	470
Groupers	----	----	55,000	1,650	95,000	2,850
King whiting or "kingfish"	1,500	45	3,000	90	600	18
Mullet	18,000	540	81,000	2,430	255,500	7,665
Pompano	----	----	----	----	800	120
Sea catfish	1,400	28	21,000	420	3,700	74
Sheepshead	3,900	156	3,800	158	16,700	668
Snapper, red	----	----	95,000	5,700	229,900	13,794
Squeteagues or "sea trout":						
Spotted	31,000	2,480	108,000	8,640	40,600	3,148
White	10,000	400	62,000	1,960	41,600	1,248
Tripletail	----	----	200	8	----	----
Crabs:						
Hard	10,800	180	1,865,500	28,035	134,700	2,261
Soft and peelers	----	----	2,700	518	----	----
Shrimp:						
Mississippi	35,000	945	1,610,200	44,156	99,600	2,589
Louisiana	637,100	17,201	13,851,700	372,692	1,259,500	34,006
Oysters, market:						
Public, spring, Mississippi	137,700	9,294	1,228,700	74,008	161,200	12,759
Public, fall, Mississippi	6,000	625	148,800	14,100	22,600	2,312
Public, spring, Louisiana	157,800	9,380	3,851,400	235,499	----	----
Public, fall, Louisiana	30,900	2,049	25,800	1,835	----	----
Total	1,102,400	44,400	23,086,900	796,003	2,405,900	85,742

LOUISIANA

Fisheries of Louisiana, 1936

OPERATING UNITS: By gear

Item	Haul seines	Gill nets, run-around	Tram-mel nets	Lines		Dip nets	
				Hand	Trot with baits or snoods	Common	Drop
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels				5			
On boats and shore:							
Regular	398	2	80	126	365	44	125
Casual	105		9	151	556	9	108
Total	503	2	89	282	921	53	233
Vessels, motor				1			
Net tonnage				5			
Boats:							
Motor	69	1	42	71	72		6
Other	82	1	11	128	849	41	217
Apparatus:							
Number	107	1	46	282	921	51	8,694
Length, yards	18,510						
Square yards		550	9,355				
Hooks, baits, or snoods				287	218,825		

Item	Cast nets	Otter trawls, shrimp	Brush traps	Dredges, oyster	Tongs, oyster	By hand, other than for oysters	Total, exclusive of duplication
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels		297		96	57		403
On boats and shore:							
Regular	27	3,346	102	51	677		4,480
Casual	40	6			12	10	932
Total	67	3,649	102	147	746	10	5,815
Vessels, motor		147		26	25		173
Net tonnage		1,072		216	178		1,279
Boats:							
Motor		1,676		17	130		1,970
Other	49		102		282		1,572
Accessory boats					24		24
Apparatus:							
Number	67	1,828	25,500	76	744		
Yards at mouth		22,533		76			

CATCH: By gear

Species	Haul seines		Gill nets, runaround		Trammel nets		Lines, hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Croaker	273,200	$6,696	300	$9	29,800	$1,158	104,200	$3,839
Drum:								
Black	90,500	2,982			13,600	455	46,000	1,841
Red or redfish	195,200	10,845	1,000	50	74,000	3,902	76,700	4,414
Flounders	7,200	473			2,800	224	700	35
Groupers							4,000	160
Jewfish							21,000	945
King whiting or "kingfish"	700	21			1,300	39		
Mullet	3,400	68			2,000	39		
Sea catfish	1,700	51			2,000	60	1,000	30
Sheepshead	105,700	3,653	100	5	16,000	719	33,400	1,480
Snapper, red							117,000	9,780
Spot	2,300	46						
Squeteagues or "sea trout":								
Spotted	345,600	27,526	6,600	528	145,300	10,602	267,500	21,952
White	165,700	5,813			21,500	673	84,400	3,332
Tripletail							700	21
Crabs:								
Hard	220,100	2,344						
Soft and peelers	74,000	11,650						
Shrimp	3,281,400	109,251						
Terrapin, diamond back	1,200	300						
Total	4,767,900	181,719	8,000	592	308,300	17,871	756,600	47,829

Fisheries of Louisiana, 1936—Continued

CATCH: By GEAR—Continued

Species	Lines—Continued		Dip nets				Cast nets	
	Trot with baits or snoods		Common		Drop			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs:								
Hard	10,773,500	$125,063	20,400	$546	1,562,400	$39,812		
Soft and peelers			12,400	2,047	98,900	12,334		
Shrimp							64,800	$2,740
Total	10,773,500	125,063	32,800	2,593	1,661,300	52,146	64,800	2,740

Species	Otter trawls		Brush traps		Dredges		Tongs		By hand	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders	11,000	$790								
Crabs, soft and peelers			180,000	$27,000						
Shrimp	50,083,600	1,724,177								
Oysters, market:										
Public, spring					388,100	$21,594	25,900	$2,015		
Public, fall					100,900	7,801	27,100	3,287		
Private, spring					684,800	50,210	2,271,600	201,111		
Private, fall					404,800	36,048	1,839,600	192,663		
Terrapin, diamond back									4,200	$750
Total	50,094,600	1,724,967	180,000	27,000	1,578,600	115,653	4,164,200	399,076	4,200	750

NOTE.—The catch as shown above for Louisiana does not include the following products, which were taken by Mississippi craft in Louisiana waters: Shrimp, 15,748,300 pounds, valued at $423,899; oysters, market, sprinz, 4,009,200 pounds of meats, valued at $244,879, and oysters, market, fall, 56,700 pounds of meats, valued at $3,884. These products have been included with the Mississippi catch.

OPERATING UNITS: By PARISHES

Item	Assumption	Calcasieu	Cameron	Iberia	Jefferson	Jefferson Davis	Lafourche	Orleans
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels					57		112	41
On boats and shore:								
Regular		20	90	12	1,046	4	770	142
Casual	50	4	1	5	8	8	5	123
Total	50	24	91	17	1,111	12	887	306
Vessels, motor					27		48	12
Net tonnage					238		340	110
Boats:								
Motor		10	45	8	382	2	355	50
Other	50	4	9	9	253	10	41	139
Accessory boats					1		15	
Apparatus:								
Haul seines			1		12		5	7
Length, yards			300		4,900		1,700	860
Gill nets, runaround				1				
Square yards				550				
Trammel nets				2	3			1
Square yards				360	680			180
Lines:								
Hand		2			26	7		54
Hooks		2			26	7		59
Trot with baits or snoods	50	3	5	4	125	10	5	16
Baits or snoods	10,000	225	750	800	37,500	750	1,000	5,200
Dip nets:								
Common								5
Drop					900			5,015
Cast nets					12			35
Otter trawls, shrimp		10	45	4	393	2	390	26
Yards at mouth		110	540	44	4,822	20	4,894	350
Brush traps					25,500			
Dredges, oyster					6		10	22
Yards at mouth					6		10	22
Tongs, oyster			6	7	20		101	8

Fisheries of Louisiana, 1936—Continued

OPERATING UNITS: By parishes—Continued

Item	Plaquemines	St. Bernard	St. Charles	St. John the Baptist	St. Mary	St. Tammany	Tangipahoa	Terrebonne	Vermilion
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	70	14			18	2		89	
On boat and shore:									
Regular	628	343	76		103	68	12	1,137	29
Casual	45	155	40	10	375	52	8	23	20
Total	743	512	116	10	496	122	20	1,249	49
Vessels, motor	31	7			8	1		39	
Net tonnage	208	50			66	9		258	
Boats:									
Motor	312	150	42		66	5		524	19
Other	135	167	68	6	385	84	20	175	17
Accessory boats	3							5	
Apparatus:									
Haul seines	5	51		4		4		11	7
Length, yards	2,750	4,850		80		445		1,680	945
Trammel nets	20	1						15	4
Square yards	3,820	190						2,625	1,500
Lines:									
Hand	14	30			20	85		44	
Hooks	14	30			20	85		44	
Trot with baits or snoods	91	94	72		404	2		30	10
Baits or snoods	35,200	18,700	21,600		80,800	700		4,100	1,500
Dip nets:									
Common						36	10		
Drop	60	279		80		1,880	480		
Cast nets							20		
Otter trawls, shrimp	250	137	38		40	2		484	7
Yards at mouth	3,052	1,666	507		543	24		5,879	82
Dredges, oyster	14				2			17	5
Yards at mouth	14				2			17	5
Tongs, oyster	168				22	8		400	4

CATCH: By parishes

Species	Assumption		Calcasieu		Cameron		Iberia		Jefferson	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Croaker			400	$16			2,300	$89	1,000	$30
Drum:										
Black					700	$29	800	24	5,700	177
Red or redfish			200	10	1,100	76	6,000	300	27,600	1,688
Flounders					3,100	155				
Sheepshead					200	8	1,600	80	3,800	114
Squeteagues or "sea trout":										
Spotted			1,500	120	9,100	728	12,600	1,008	28,600	2,288
White							700	24	600	18
Tripletail									700	21
Crabs:										
Hard	601,000	$7,512	3,200	108	11,400	228	4,600	126	2,957,300	30,392
Soft and peelers									202,500	30,000
Shrimp			254,000	9,398	1,154,400	42,712	32,000	1,280	12,257,400	397,458
Oysters, market:										
Public, spring					6,400	400				
Public, fall					6,200	515				
Private, spring							18,700	1,875	84,400	8,160
Private, fall							13,600	1,575	101,200	10,140
Total	601,000	7,512	259,300	9,652	1,192,600	44,851	92,900	6,381	15,670,800	480,486

Fisheries of Louisiana, 1936—Continued

CATCH: BY PARISHES—Continued

Species	Jefferson Davis		La Fourche		Orleans		Plaquemines	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Croaker	400	$20			21,300	$688	21,400	$837
Drum:								
Black					13,800	504	6,600	198
Red or redfish					51,500	2,642	31,600	1,637
Flounders					1,000	59	2,900	232
Groupers					4,000	160		
Jewfish					21,000	945		
Mullet					3,300	65		
Sea catfish							1,000	30
Sheepshead					18,400	884	13,500	650
Snapper, red					42,000	3,780		
Spot					2,000	40		
Squeteagues or "sea trout":								
Spotted	5,000	500			70,400	5,990	76,800	5,482
White					19,900	746	24,100	718
Crabs:								
Hard	9,000	270	16,000	$180	1,198,600	30,057	1,900,000	21,200
Soft and peelers					23,400	3,445		
Shrimp	24,000	960	12,354,700	468,745	442,400	16,932	6,059,400	225,426
Oysters, market:								
Public, spring					145,500	8,550	246,800	13,463
Public, fall					100,900	7,801	18,000	2,400
Private, spring			480,100	46,538	335,600	29,645	729,400	67,153
Private, fall			398,000	42,020	309,500	27,655	906,300	99,431
Total	38,400	1,750	13,248,800	557,483	2,824,500	140,588	10,037,800	438,857

Species	St. Bernard		St. Charles		St. John the Baptist		St. Mary	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Croaker	277,800	$6,654					4,000	$120
Drum:								
Black	66,200	1,994					5,000	300
Red or redfish	113,600	6,626					19,600	1,372
Flounders	5,000	300						
Sheepshead	85,300	2,558					7,100	213
Snapper, red							75,000	6,000
Squeteagues or "sea trout":								
Spotted	245,400	19,952					26,300	2,104
White	144,000	4,910						
Crabs:								
Hard	1,114,300	11,384	332,200	$3,322	16,000	$480	3,836,900	47,950
Soft and peelers	83,600	13,090						
Shrimp	3,892,000	136,750	1,073,000	37,555	7,200	150	1,180,100	42,380
Oysters, market:								
Private, spring							77,400	6,317
Private, fall							52,600	4,208
Terrapin, diamond back	3,000	750						
Total	6,030,200	204,968	1,405,200	40,877	23,200	630	5,284,000	110,964

Species	St. Tammany		Tangipahoa		Terrebonne		Vermilion	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Croaker	51,800	$2,137			23,800	$952	3,300	$159
Drum:								
Black					49,900	1,996	1,400	56
Red or redfish	17,100	870			73,000	3,650	5,600	340
Flounders					9,500	760	200	16
King whiting or "kingfish"					2,000	60		
Mullet					2,100	42		
Sea catfish					3,700	111		
Sheepshead	8,000	480			14,500	710	2,800	160
Spot					300	6		
Squeteagues or "sea trout":								
Spotted	110,500	10,330			151,800	9,946	27,000	2,160
White	46,300	1,902			30,000	1,200	6,000	300
Crabs:								
Hard	329,700	10,044	96,000	$2,880	141,600	1,416	8,600	216
Soft and peelers	45,600	4,896	10,200	1,600				
Shrimp	58,000	2,146	20,000	800	14,520,000	450,636	101,200	2,840
Oysters, market:								
Public, spring	15,300	1,196						
Public, fall	2,900	372						
Private, spring					1,169,900	87,833	60,900	3,800
Private, fall					450,000	42,582	13,200	1,100
Terrapin, diamond back					2,400	300		
Total	685,200	34,373	126,200	5,280	16,644,500	602,200	230,200	11,147

TEXAS

Fisheries of Texas, 1936

OPERATING UNITS: By gear

Item	Haul seines	Gill nets		Trammel nets	Lines			
		Runaround	Stake		Hand	Troll	Trot with baits or snoods	Trot with hooks
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels					56			
On boats and shore:								
Regular	8	70	149	174	126			116
Casual	8			22	77	6	38	8
Total	16	70	149	196	259	6	38	124
Vessels, motor					8			
Net tonnage					127			
Boats:								
Motor		36	40	90	66	4	7	47
Other	6		35	7	85		31	52
Apparatus:								
Number	8	89	287	98	259	6	38	124
Length, yards	850							
Square yards		25,350	81,300	53,990				
Hooks, baits, or snoods					259	6	11,700	64,200

Item	Dip nets	Otter trawls, shrimp	Pots, crab	Spears	Dredges, oyster	Tongs, oyster	Total, exclusive of duplication
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels		72			8		130
On boats and shore:							
Regular	20	644	2	74	107	124	1,103
Casual	3	2	5	107	17	58	286
Total	23	718	7	181	132	182	1,519
Vessels, motor		34			2		41
Net tonnage		311			26		423
Boats:							
Motor		317	2		41	46	501
Other	23		5	8		57	245
Apparatus:							
Number	23	351	68	181	62	168	
Yards at mouth		5,639			68		

CATCH: By gear

Species	Haul seines		Gill nets				Trammel nets	
			Runaround		Stake			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Buffalofish							200	$8
Croaker	1,000	$20	1,400	$38	12,000	$310	36,000	1,090
Drum:								
Black	48,400	1,302	361,100	8,149	1,367,700	29,156	230,600	7,206
Red or redfish	50,100	3,486	68,300	4,978	261,700	17,552	341,600	24,609
Flounders							14,400	1,372
King whiting or "kingfish"							100	5
Pompano					100	15		
Sea catfish					100	5	700	29
Sheepshead	800	16	2,800	76	9,600	262	49,400	1,447
Snook or sergeantfish			2,000	160	5,000	400		
Spanish mackerel			2,700	130	3,000	160	1,000	65
Spot	4,100	82			1,500	30	5,000	100
Squeteagues or "sea trout," spotted	31,000	2,520	161,600	13,742	650,100	55,330	629,100	51,917
Total	135,400	7,426	599,900	27,273	2,310,800	103,220	1,308,100	87,848

Fisheries of Texas, 1936—Continued

CATCH: BY GEAR—Continued

Species	Lines								Dip nets	
	Hand		Troll		Trot, with baits or snoods		Trot, with hooks			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Catfish and bullheads							53, 200	$5, 132		
Croaker	500	$15					1, 500	45		
Drum:										
Black	40, 700	1, 540					208, 000	8, 487		
Red or redfish	69, 300	5, 191					164, 600	13, 251		
Groupers	34, 100	1, 507								
Jewfish	2, 900	107								
Kingfish or "king mackerel"			2, 800	$112						
Sea catfish	500	15					1, 800	94		
Sheepshead	500	15					2, 900	85		
Snapper, red	906, 600	58, 436								
Spanish mackerel	10, 000	630								
Squeteagues or "sea trout," spotted	99, 900	8, 935					264, 500	23, 725		
Crabs, hard					142, 000	$5, 350			132, 600	$1, 915
Total	1, 165, 000	76, 391	2, 800	112	142, 000	5, 350	696, 500	50, 819	132, 600	1, 915

Species	Otter trawls		Pots, crab		Spears		Dredges		Tongs	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders					89, 100	$8, 846				
King whiting or "kingfish"	15, 000	$450								
Crabs, hard			45, 000	$900						
Shrimp	9, 962, 500	328, 603								
Oysters, market:										
Public, spring							284, 400	$26, 585	190, 100	$18, 375
Public, fall							182, 300	17, 755	129, 400	12, 510
Private, spring									24, 600	1, 923
Private, fall									12, 300	962
Total	9, 977, 500	329, 053	45, 000	900	89, 100	8, 846	466, 700	44, 340	356, 400	33, 770

OPERATING UNITS: BY COUNTIES

Item	Aransas	Brazoria	Calhoun	Cameron	Galveston	Harris
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels	2			5	85	
On boats and shore:						
Regular	127	17	149	148	192	2
Casual			24	29	71	33
Total	129	17	173	182	348	35
Vessels, motor	1			1	22	
Net tonnage	13			6	260	
Boats:						
Motor	51	11	70	42	109	16
Other	32		25	46	41	3
Apparatus:						
Haul seines				2		
Length, yards				250		
Gill nets:						
Runaround	8			50		
Square yards	2, 400			16, 500		
Stake				210		
Square yards				63, 000		
Trammel nets	21		29		11	8
Square yards	12, 600		20, 360		3, 500	2, 480
Lines:						
Hand			30	50	58	
Hooks			30	50	58	
Troll				6		
Hooks				6		
Trot with baits or snoods					35	3
Baits or snoods					10, 500	1, 200

Fisheries of Texas, 1936—Continued

OPERATING UNITS: By counties—Continued

Item	Aransas	Brazoria	Calhoun	Cameron	Galveston	Harris
Apparatus—Continued.						
Lines—Continued.	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Trot with hooks		5	16			2
Hooks		1,500	4,800			600
Dip nets	20					
Otter trawls, shrimp	29	6	53	15	104	1
Yards at mouth	468	90	821	233	1,779	4
Pots, crab					68	
Spears	10		58	8		
Dredges, oyster	17		20		6	3
Yards at mouth	21		20		7	3
Tongs, oyster	18		34	18	14	12

Item	Jefferson	Kleberg	Matagorda	Nueces	San Patricio
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels			12	4	22
On boats and shore:					
Regular	7	36	134	163	128
Casual	2		18	87	22
Total	9	36	164	254	172
Vessels, motor			4	2	11
Net tonnage			45	19	85
Boats:					
Motor	3	16	63	63	57
Other		12	8	63	15
Apparatus:					
Haul seines				6	
Length, yards				600	
Gill nets:					
Runaround				31	
Square yards				6,450	
Stake				64	13
Square yards				12,800	5,500
Trammel nets			7		22
Square yards			4,850		10,200
Lines:					
Hand	7	24		65	25
Hooks	7	24		65	25
Trot with hooks		36		61	4
Hooks		32,000		24,500	800
Dip nets				3	
Otter trawls, shrimp			56	31	56
Yards at mouth			846	525	873
Spears			30	60	15
Dredges, oyster			12	4	
Yards at mouth			13	4	
Tongs, oyster	2		48	14	8

CATCH: By counties

Species	Aransas		Brazoria		Calhoun	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Buffalofish					200	$8
Catfish and bullheads					52,800	5,100
Croaker	2,000	$60				
Drum:						
Black	58,900	1,767			79,900	2,530
Red or redfish	39,100	2,740	10,200	$816	90,600	7,171
Flounders	4,800	340			41,800	4,530
King whiting or "kingfish"					2,000	60
Sea catfish					200	14
Sheepshead, salt water	4,300	130			300	9
Spanish mackerel	700	30				
Squeteagues or "sea trout," spotted	84,000	6,720	1,200	120	165,000	14,572
Crabs, hard	97,200	1,215				
Shrimp	509,700	18,859	198,000	7,350	613,600	18,405
Oysters, market:						
Public, spring	123,600	11,035			73,900	5,715
Public, fall	88,000	7,915			34,400	2,585
Total	1,012,300	50,811	209,400	8,286	1,154,700	60,699

Fisheries of Texas, 1936—Continued

CATCH: BY COUNTIES—Continued

Species	Cameron		Galveston		Harris		Jefferson	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Croaker	6,400	$128	22,000	$660				
Drum:								
Black	1,558,300	31,166	21,600	650				
Red or redfish	211,200	12,672	111,000	6,670	18,000	$1,200		
Flounders	800	56	4,000	320				
Groupers	4,000	160	7,900	237			22,200	$1,110
Jewfish	2,000	80	900	27				
Kingfish or "king mackerel"	2,800	112						
King whiting or "kingfish"			9,000	270				
Pompano	100	15						
Sea catfish	100	5			800	64		
Sheepshead, salt-water	4,200	84	32,000	960				
Snapper, red	48,500	3,638	775,300	46,518			82,800	8,280
Snook or sergeantfish	5,000	400						
Spanish mackerel			6,000	360				
Spot	2,000	40	5,000	100				
Squeteagues or "sea trout," spotted	736,300	62,640	180,000	12,600	39,500	3,160		
Crabs, hard			166,000	5,700	21,000	550		
Shrimp	254,200	8,900	3,047,300	113,825	8,000	160		
Oysters, market:								
Public, spring	7,700	600	33,800	3,600	52,600	4,880	7,800	600
Public, fall	3,200	300	34,600	3,900	35,600	3,300	3,200	300
Total	2,846,800	120,996	4,456,400	196,397	175,500	13,314	116,000	10,290

Species	Kleberg		Matagorda		Nueces		San Patricio	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Catfish and bullheads					400	$32		
Croaker			3,000	$90	6,000	180	13,000	$400
Drum:								
Black	133,800	$6,020	48,600	1,469	301,500	10,381	53,900	1,857
Red or redfish	11,800	1,065	64,400	5,254	346,500	27,235	52,800	4,244
Flounders			17,400	1,762	22,700	2,250	12,000	960
King whiting or "kingfish"			100	5			4,000	120
Sea catfish							2,000	60
Sheepshead, salt water			3,200	98	6,000	180	16,000	440
Snook or sergeantfish					2,000	160		
Spanish mackerel					4,000	200	6,000	395
Spot					3,600	72		
Squeteagues or "sea trout," spotted	36,000	3,245	92,000	9,050	363,000	32,425	139,200	11,637
Crabs, hard					35,400	700		
Shrimp			2,554,800	76,622	695,200	22,850	2,081,700	61,632
Oysters, market:								
Public, spring			161,400	17,155	9,700	1,000	4,000	375
Public, fall			105,000	11,195	4,800	500	2,900	270
Private, spring			24,600	1,923				
Private, fall			12,300	962				
Total	181,600	10,330	3,086,800	125,585	1,800,800	98,165	2,387,500	82,390

FISHERIES OF THE PACIFIC COAST STATES [9]

The yield of the commercial fisheries of the Pacific Coast States (Washington, Oregon, and California) during 1936 amounted to 1,925,342,300 pounds, valued at $24,881,509 to the fishermen, representing an increase of 15 percent in volume and 8 percent in value as compared with the catch in the previous year. These fisheries gave employment to 20,620 fishermen as compared with 20,583 in 1935.

[9] Data on the operating units and catch of the fisheries of the Pacific Coast States have been taken largely from statistics collected by the various State agencies. Supplementary surveys, compilations, and analyses have been made by agents of this Bureau in order that the figures may be presented in a manner comparable with those of other sections. While statistics of the fisheries of California are for the calendar year, those for Oregon and Washington are for the fiscal year ending March 31, 1937, except that statistics of the halibut fishery in these latter States are for the calendar year. For a clearer understanding of the statistics published in this section the reader is referred to the section in the latter part of this document entitled "Statistical survey procedure."

There were 339 fishery wholesale and manufacturing establishments in the three States in 1936 as compared with 337 in 1935. During 1936 these establishments employed 16,589 persons, paid $9,365,375 in salaries and wages, and produced manufactured products (canned, cured, packaged, and byproducts) valued at $52,498,170. In 1935 the wholesale and manufacturing firms employed 14,750 persons, paid $6,531,351 in salaries and wages, and produced manufactured products valued at $51,243,348.

Fisheries of the Pacific Coast States, 1936

SUMMARY OF CATCH

Product	Washington		Oregon	
	Pounds	*Value*	*Pounds*	*Value*
Fish	97,037,400	$4,601,843	54,385,800	$1,740,415
Shellfish, etc	10,381,000	998,510	3,355,600	254,655
Total	107,418,400	5,600,353	57,741,400	1,995,070

Product	California		Total	
	Pounds	*Value*	*Pounds*	*Value*
Fish	1,749,614,900	$16,601,327	1,901,038,100	$22,943,585
Shellfish, etc	7,778,000	602,807	21,514,600	1,855,972
Whale products	2,789,600	81,952	2,789,600	81,952
Total	1,760,182,500	17,286,086	1,925,342,300	24,881,509

OPERATING UNITS: BY STATES

Item	Washington				Oregon		
	Puget Sound district	Coastal district	Columbia River district	Total	Columbia River district	Coastal district	Total
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:							
On vessels	3,321	68	15	3,404	97	41	138
On boats and shore	1,940	3,962	911	6,813	2,174	1,415	3,589
Total	5,261	4,030	926	10,217	2,271	1,456	3,727
Vessels:							
Motor	511	34	6	551	40	20	60
Net tonnage	10,421	252	65	10,738	439	157	596
Sail	3			3			
Net tonnage	1,346			1,346			
Total vessels	514	34	6	554	40	20	60
Total net tonnage	11,767	252	65	12,084	439	157	596
Boats:							
Motor	810	412	628	1,850	1,054	1,002	2,056
Other	303	184	18	505	99	130	229
Accessory boats	265			265	1		1
Apparatus:							
Purse seines:							
Herring	2			2			
Length, yards	234			234			
Salmon	172			172			
Length, yards	94,300			94,300			
Sardine [1]	34			34	1		1
Length, yards	12,716			12,716	500		500
Haul seines	196	4	2	202	42	7	49
Length, yards	14,142	280	251	14,673	22,700	1,040	23,740

[1] Used in the pilchard fishery of the Washington and Oregon coasts by Puget Sound purse seine vessels. See separate sections for catch statistics.

Fisheries of the Pacific Coast States, 1936—Continued

OPERATING UNITS: By States—Continued

Item	Washington				Oregon		
	Puget Sound district	Coastal district	Columbia River district	Total	Columbia River district	Coastal district	Total
Apparatus—Continued							
Gill nets:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Drift	323	188	484	995	755	451	1,206
Square yards	487,730	358,608	1,339,712	2,186,050	2,409,205	635,459	3,044,664
Set	[2] 6	[2] 110		[2] 116	123	936	1,059
Square yards	1,440	27,500		28,940	34,440	336,960	371,400
Lines:							
Trawl, set, and hand	27,571		344	27,915	625	203	828
Hooks	568,190		11,016	579,206	18,845	6,380	25,225
Troll	1,790	555	204	2,549	844	679	1,523
Hooks	7,912	2,498	714	11,124	3,580	3,055	6,635
Pound nets	[2] 2			[2] 2	38		38
Brush weirs	8			8			
Dip nets	31	60	219	310	252		252
Reef nets	23			23			
Beam trawls	10			10			
Yards at mouth	66			66			
Otter trawls	49			49	1	1	2
Yards at mouth	675			675	24	20	44
Traps:							
Crab	3,765	3,610		7,375		17,745	17,745
Crawfish					1,534		1,534
Octopus	570			570			
Dredges, oyster	2	4		6			
Yards at mouth	2	8		10			
Tongs and rakes	110	190		300		8	8
Shovels	386	3,288		3,674		194	194

Item	California						Grand total
	Northern district	San Francisco district	Monterey district	San Pedro district	San Diego district	Total	
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	31	541	652	1,849	793	3,866	7,408
On boats and shore	267	833	532	904	274	2,810	13,212
Total	298	1,374	1,184	2,753	1,067	6,676	20,620
Vessels:							
Steam		2				2	2
Net tonnage		41				41	41
Motor	16	53	66	199	84	418	1,029
Net tonnage	134	1,652	2,239	8,220	4,877	17,122	28,456
Sail		2				2	5
Net tonnage		824				824	2,170
Total vessels	16	57	66	199	84	422	1,036
Total net tonnage	134	2,517	2,239	8,220	4,877	17,987	30,667
Boats:							
Motor	188	534	215	475	119	1,531	5,437
Other		51	34	40	4	129	863
Accessory boats		108	80	183	85	456	722
Apparatus:							
Purse seines:							
Herring							2
Length, yards							234
Mackerel				9		9	9
Length, yards				3,924		3,924	3,924
Salmon							172
Length, yards							94,300
Sardine		19	37	74		130	165
Length, yards		7,731	12,006	27,582		47,319	60,535
Tuna		3	4	57		64	64
Length, yards		1,750	2,347	33,513		37,610	37,610

[2] Fished only on Indian reservations.

Fisheries of the Pacific Coast States, 1936—Continued

OPERATING UNITS: By States—Continued

Item	California						Grand total
	Northern district	San Francisco district	Monterey district	San Pedro district	San Diego district	Total	
Apparatus—Continued.							
Lampara and ring nets:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Mackerel		1	4	59	15	79	79
Length, yards		360	1,900	27,909	4,770	34,939	34,939
Sardine		14	34	55	19	122	122
Length, yards		4,275	10,363	25,895	6,056	46,589	46,589
Other			22	6		28	28
Length, yards			4,500	2,164		6,664	6,664
Haul seines		3				3	254
Length, yards		567				567	38,980
Gill nets:							
Drift:							
Barracuda				12	9	21	21
Square yards				104,960	54,868	159,828	159,828
Salmon		114				114	2,315
Square yards		377,980				377,980	5,608,694
Shad		139				139	139
Square yards		500,882				500,882	500,882
Sea bass		4	14			18	18
Square yards		8,400	33,152			41,552	41,552
Set:							
"California halibut"			18			18	18
Square yards			55,395			55,395	55,395
Crab			9			9	9
Square yards			30,960			30,960	30,960
Salmon							1,175
Square yards							400,340
Sea bass				16	12	28	28
Square yards				53,104	64,148	117,252	117,252
Miscellaneous	20	45	44	23	5	137	137
Square yards	15,000	68,775	48,809	22,350	4,500	159,434	159,434
Trammel nets				26	11	37	37
Square yards				153,501	105,991	259,492	259,492
Lines:							
Trawl, set, and hand	301	759	859	2,334	1,057	5,310	34,053
Hooks	33,789	39,012	82,394	279,797	26,826	461,818	1,066,249
Troll	983	1,388	868	1,861	503	5,603	9,675
Hooks	4,274	6,579	2,904	1,903	503	16,163	33,922
Pound nets							40
Brush weirs							8
Fyke nets		1,938				1,938	1,938
Dip nets	42	7				49	611
Bag nets, shrimp		11				11	11
Length, yards		8,080				8,080	8,080
Reef nets							23
Paranzella nets		9		3		12	12
Yards at mouth		150		50		200	200
Beam trawls		17				17	27
Yards at mouth		113				113	179
Otter trawls	2	1	4			7	58
Yards at mouth	20	10	44			74	793
Traps:							
Crab	695	5,324	122			6,141	31,261
Crawfish							1,534
Sea crawfish			35	5,740	930	6,705	6,705
Octopus			92			92	662
Harpoons:							
Swordfish				57	15	72	72
Whale		2				2	2
Dredges, oyster							6
Yards at mouth							10
Tongs and rakes		25	7			32	340
Shovels	13	42	35	83		173	4,041
Abalone outfits		1	16	5		22	22

NOTE.—In addition to the California operating units shown above, 124 motor vessels, 120 accessory boats and 2 motorboats having their home ports in the State of Washington, and 14 vessels, 3 accessory boats, and 13 motorboats having their home ports in the State of Oregon, were operated off California and contributed to the California catch. The following gear was operated by these craft: 4 mackerel purse seines, 108 sardine purse seines, 4 tuna purse seines, 22 mackerel ring nets, 18 sardine ring nets, 158 set and hand lines, and 174 troll lines.

Fisheries of the Pacific Coast States, 1936—Continued

CATCH: BY STATES

Species	Washington		Oregon	
FISH	*Pounds*	*Value*	*Pounds*	*Value*
Carp	87,300	$2,382		
Cod [1]	7,771,300	122,866	600	$9
Flounders:				
"Sole"	4,523,500	91,946	148,400	2,984
Other	291,200	6,435	5,600	91
Grayfish	330,700	764		
Halibut	24,090,900	2,069,334	277,300	21,919
Herring	989,700	9,400	23,100	268
"Lingcod"	1,566,400	40,613	168,700	4,139
Perch	102,600	3,210	11,400	241
Pilchard or sardine	13,114,400	65,638	28,393,300	141,966
Rockfishes	566,900	17,369	121,100	3,322
Sablefish	2,767,000	108,605	270,500	8,156
Salmon:				
Blueback, red, or sockeye	3,504,700	307,352	284,700	30,223
Chinook or king	12,989,100	966,096	14,520,500	1,138,724
Chum or keta	11,232,500	202,632	1,877,100	20,091
Humpback or pink	123,800	2,482		
Silver or coho	9,576,900	465,766	4,899,700	213,929
Shad	57,400	1,722	665,500	19,962
Smelts:				
Eulachon	2,247,600	55,628	312,900	7,520
Other	571,900	33,937	4,700	161
Steelhead trout	452,200	24,173	2,241,100	119,977
Striped bass			29,100	1,950
Sturgeon	79,400	3,493	102,900	2,875
Tuna, albacore			27,600	1,908
Total	97,037,400	4,601,843	54,385,800	1,740,415
SHELLFISH, ETC.				
Crabs	1,780,900	128,343	3,081,600	218,511
Crawfish, fresh water			86,900	9,559
Shrimp	101,600	13,208		
Clams:				
Hard	877,800	64,215		
Razor	860,200	128,013	64,500	12,286
Mixed			85,800	6,541
Octopus	100,300	4,092		
Oysters, market:				
Eastern	1,300	337		
Japanese	6,306,300	446,377	28,900	2,475
Native	304,800	207,481	7,900	5,283
Scallops, bay	21,800	5,128		
Squid	16,300	929		
Trepang	9,700	387		
Total	10,381,000	998,510	3,355,600	254,655
Grand total	107,418,400	5,600,353	57,741,400	1,995,070

Species	California [2]		Total	
FISH	*Pounds*	*Value*	*Pounds*	*Value*
Anchovies	195,100	$2,187	195,100	$2,187
Barracuda	2,977,800	140,752	2,977,800	140,752
Cabrilla	196,900	6,675	196,900	6,675
Carp	108,800	1,351	196,100	3,733
Catfish	304,600	37,161	304,600	37,161
Cod [1]	5,150,100	79,800	12,922,000	202,675
Flounders:				
"California halibut"	1,589,400	119,969	1,589,400	119,969
"Sole"	8,324,900	443,999	12,996,800	538,929
Other	1,359,200	83,244	1,656,000	89,770
Flyingfish	55,600	2,040	55,600	2,040
Grayfish	471,800	9,509	802,500	10,273
Groupers	60,500	2,574	60,500	2,574
Hake	50,800	548	50,800	548
Halibut	524,000	39,115	24,892,200	2,130,368
Hardhead	106,700	5,485	106,700	5,485
Herring	840,400	3,975	1,853,200	13,643
Horse mackerel	4,599,400	37,751	4,599,400	37,751
Kingfish	652,000	15,882	652,000	15,882

[1] All of the cod reported for California and most of the Washington catch were taken off Alaska.
[2] Includes the catch taken off Latin America.

Fisheries of the Pacific Coast States, 1936—Continued

CATCH: BY STATES—Continued

Species	California		Total	
FISH—continued	*Pounds*	*Value*	*Pounds*	*Value*
"Lingcod"	758,200	$30,298	2,493,300	$75,050
Mackerel	100,542,200	931,715	100,542,200	931,715
Marlin	16,600	515	16,600	515
Mullet	10,600	787	10,600	787
Perch	207,800	9,429	321,800	12,880
Pilchard or sardine	1,460,791,500	6,891,295	1,502,299,200	7,098,899
Pompano	7,900	3,595	7,900	3,595
Rock bass	416,200	21,516	416,200	21,516
Rockfishes	4,600,600	164,589	5,288,600	185,280
Rudderfishes	43,900	2,926	43,900	2,296
Sablefish	1,035,500	31,846	4,073,000	148,607
Salmon:				
Blueback, red, or sockeye			3,789,400	337,575
Chinook or king	5,021,500	360,598	32,531,100	2,465,418
Chum or keta			13,109,600	222,723
Humpback or pink			123,800	2,482
Silver or coho			14,476,600	679,695
Sculpin	128,800	9,525	128,800	9,525
Sea bass:				
Black	397,600	22,335	397,600	22,335
White	808,000	61,672	808,000	61,672
Shad	2,273,000	45,760	2,995,900	67,444
Sheepshead	128,600	4,533	128,600	4,533
Skates	382,000	4,158	382,000	4,158
Smelts:				
Eulachon			2,560,500	63,148
Other	841,200	31,541	1,417,800	65,639
Spanish mackerel	18,000	1,008	18,000	1,008
Splittail	29,300	528	29,300	528
Squawfish	500	24	500	24
Steelhead trout			2,693,300	144,150
Striped bass			29,100	1,950
Sturgeon			182,300	6,368
Suckers	48,100	706	48,100	706
Swordfish	577,400	64,193	577,400	64,193
Tomcod	4,200	83	4,200	83
Tuna and tunalike fishes:				
Albacore	956,700	88,795	984,300	90,703
Bluefin	18,924,900	922,332	18,924,900	922,332
Bonito	7,215,900	221,466	7,215,900	221,466
Skipjack or striped tuna	26,992,200	1,191,134	26,992,200	1,191,134
Yellowfin	78,352,700	4,139,211	78,352,700	4,139,211
Whitebait	197,800	8,733	197,800	8,733
Whitefish	46,500	2,523	46,500	2,523
Yellowtail	10,092,500	298,552	10,092,500	298,552
Other fish	178,500	2,019	178,500	2,019
Total	1,749,614,900	16,601,327	1,901,038,100	22,943,585
SHELLFISH, ETC.				
Crabs	2,327,900	255,444	7,190,400	602,298
Crawfish, fresh water			86,900	9,559
Sea crawfish or spiny lobster	1,335,000	148,426	1,335,000	148,426
Shrimp	2,242,700	32,045	2,344,300	45,253
Abalone	660,400	92,711	660,400	92,711
Clams:				
Hard	14,900	2,525	892,700	66,740
Pismo	52,400	10,722	52,400	10,722
Razor			924,700	140,299
Soft	29,100	6,056	29,100	6,056
Mixed			85,800	6,541
Octopus	62,400	3,676	162,700	7,768
Oysters, market:				
Eastern	58,900	18,320	60,200	18,657
Japanese	41,400	7,813	6,376,600	456,665
Native	4,300	1,078	317,000	213,842
Scallops, bay			21,800	5,128
Squid	945,500	23,857	961,800	24,786
Turtles	2,700	121	2,700	121
Trepang			9,700	387
Other shellfish	400	13	400	13
Total	7,778,000	602,807	21,514,600	1,855,972

Fisheries of the Pacific Coast States, 1936—Continued

CATCH: BY STATES—Continued

Species	California		Total	
WHALE PRODUCTS	*Pounds*	*Value*	*Pounds*	*Value*
Whale meat	1,600,000	$32,000	1,600,000	$32,000
Whale oil	1,189,600	49,952	1,189,600	49,952
Total	2,789,600	81,952	2,789,600	81,952
Grand total	1,760,182,500	17,286,086	1,925,342,300	24,881,509

Industries related to the fisheries of the Pacific Coast States, 1936

OPERATING UNITS, SALARIES, AND WAGES

Item	Washington	Oregon	California	Total
Transporting:				
Persons engaged	*Number* 129	*Number* 48	*Number* 29	*Number* 206
Vessels:				
Steam			1	1
Net tonnage			32	32
Motor	51	24	3	78
Net tonnage	1,214	294	151	1,659
Total vessels	51	24	4	79
Total net tonnage	1,214	294	183	1,691
Wholesale and manufacturing:				
Establishments	115	58	166	339
Persons engaged:				
Proprietors	53	38	258	349
Salaried employees	255	99	700	1,054
Wage earners:				
Average for season	2,998	1,076	11,112	15,186
Average for year	1,221	478	3,967	5,666
Paid to salaried employees	$510,996	$170,975	$2,175,742	$2,857,713
Paid to wage earners	$1,161,047	$462,163	$4,884,452	$6,507,662
Total salaries and wages	$1,672,043	$633,138	$7,060,194	$9,365,375
Fishermen manufacturing	128	13	137	278

PRODUCTS MANUFACTURED

Item	Washington		Oregon		California	
By manufacturing firms:	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Barracuda, fresh fillets—pounds					860,000	$107,500
Cabrilla, fresh fillets—do					60,000	8,400
Cod, salted:						
Dry, partly boned—do	227,327	$19,421				
Boneless and absolutely boneless—pounds	824,806	122,548			(1)	(1)
Flounders:						
Fresh fillets—do	204,775	29,776	(1)	(1)	1,825,000	304,025
Frozen fillets—do	225,585	30,342				
Grayfish, fresh fillets—do					110,000	11,000
Halibut, frozen steaks—do	267,852	39,803				
"Lingcod", fresh fillets—do	(1)	(1)	(1)	(1)	160,000	21,700
Mackerel:						
Canned—standard cases					1,229,607	3,471,196
Meal—tons					3,025	90,254
Oil—gallons					191,753	63,454
Pilchard:						
Canned "sardines"—standard cases					2,616,530	7,302,273
Meal—tons	(1)	(1)	2,426	$77,661	118,330	3,852,597
Oil—gallons	(1)	(1)	470,836	139,375	25,467,136	8,143,603
Rockfishes, fresh fillets—pounds	(1)	(1)	(1)	(1)	920,000	118,600

See footnotes at end of table.

Industries related to the fisheries of the Pacific Coast States, 1936—Continued

PRODUCTS MANUFACTURED—Continued

Item	Washington		Oregon		California	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
By manufacturing firms—Continued.						
Sablefish:						
Fresh fillets—pounds					165,000	$17,800
Kippered—do	344,361	$55,913			(1)	(1)
Salted—do	241,067	13,423	(1)	(1)		
Salmon:						
Salted:						
Mild cured [2]—do	4,334,175	860,640	885,940	$180,281	1,847,087	405,831
Eggs for caviar—do	120,208	11,111	(1)	(1)		
Kippered—do	1,884,127	304,018	55,946	10,914		
Smoked—do	116,560	19,333	(1)	(1)	186,857	83,715
Canned:						
Blueback, red, or sockeye standard cases	63,863	880,669	4,822	67,546		
Chinook or king—do	62,522	777,611	163,745	2,239,659		
Chum or keta—do	105,131	385,518	38,743	140,663		
Humpback or pink—do	170	891				
Silver or coho—do	35,227	314,849	34,069	297,392		
Steelhead trout—do	3,735	37,031	15,547	167,609		
Eggs for bait—do	2,428	49,941	(1)	(1)		
Oil, edible—gallons			13,372	20,058		
Sea bass:						
Black, fresh steaks—pounds					240,000	29,100
White, fresh fillets—do					165,000	29,325
Shad:						
Canned—standard cases	1,570	3,925	2,561	6,542	13,214	36,338
Roe, canned—do	(1)	(1)	857	24,827	(1)	(1)
Sheepshead, fresh fillets—pounds					35,000	5,250
Swordfish, fresh steaks—do					340,000	83,375
Totuava, fresh steaks—do					675,000	108,000
Tuna and tunalike fishes:						
Canned:						
Albacore—standard cases					63,120	418,003
Bluefin—do					314,019	1,633,701
Bonito—do					131,137	577,098
Striped—do					428,848	2,215,513
"Tonno"—do					172,326	1,212,103
Yellowfin—do					1,437,236	8,079,499
Yellowtail—do					134,048	579,474
Meal—tons					8,822	269,155
Oil—gallons					166,161	34,767
Abalone, steaks—pounds					656,700	199,402
Clams, hard:						
Canned:						
Whole—standard cases	24,824	99,706				
Minced—do	23,599	107,523				
Juice—do	5,224	11,329				
Fresh shucked—gallons	3,205	3,989	(1)	(1)		
Shells, crushed for poultry feed tons	1,419	14,280				
Clams, razor:						
Canned:						
Whole—standard cases	2,492	23,006	(1)	(1)		
Minced—do	36,017	296,719	998	7,138		
Crabs:						
Canned—do			164	4,828		
Meat, packaged, fresh cooked pounds	91,074	39,613	308,054	126,065		
Oysters:						
Japanese:						
Fresh shucked—gallons	347,592	422,307	70,324	87,390	(1)	(1)
Canned—standard cases	118,853	504,270				
Soup, canned—do	16,139	80,331				
Native, fresh shucked—gallons	15,623	113,886	8,267	62,352	(1)	(1)
Shell products:						
Poultry feed—tons	1,869	18,896	(1)	(1)	14,648	74,004
Lime—do	882	6,906	(1)	(1)	(1)	(1)
Shrimp, bran and meal—do					217	4,340
Squid, canned—standard cases					8,068	30,708
Unclassified:						
Packaged—pounds	[3] 124,578	[3] 17,786	(4)	(4)	(4)	(4)
Salted—do	[5] 1,327,061	[5] 69,945	[6] 4,304	[6] 1,292	[7] 1,195,191	[7] 135,310
Smoked—do	(4)	(4)	[8] 42,079	[8] 9,738	[9] 182,781	[9] 33,717
Canned:						
Cat and dog food standard cases					222,136	656,703
Other—do	[10] 921	[10] 9,561	[11] 1,092	[11] 16,755	(4)	(4)
Meal—tons	[12] 1,733	[12] 74,195	(4)	(4)	[13] 1,520	[13] 33,363
Oil—gallons	[14] 289,796	[14] 963,590	(4)	(4)	[13] 176,071	[15] 787,832
Miscellaneous		[16] 10,521		[17] 30,062		[18] 666,873
Total		6,845,122		3,718,147		41,934,901

See footnotes at end of table.

Industries related to the fisheries of the Pacific Coast States, 1936—Continued

PRODUCTS MANUFACTURED—Continued

Item	Washington		Oregon		California	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
By fishermen:						
Cod, green salted [1] pounds	2,283,118	$114,335			1,596,539	$79,800
Cod, tongues, salted do	11,650	941				
Sablefish, salted do	32,830	1,313				
Crab meat, packaged, fresh cooked pounds			5,186	$1,971		
Clams, mixed, fresh shucked gallons			3,440	3,784		
Scallops, bay, fresh shucked do	570	1,282				
Shrimp:						
Dried pounds					153,656	24,585
Bran tons					167	3,348
Shark-liver oil gallons	2,500	650				
Total		118,521		5,755		107,733
Grand total		6,963,643		3,723,902		42,042,634

[1] The production of this item has been included under "Unclassified products."
[2] This item is usually an intermediate product, and although included in the total, may be shown in its final stage of processing in this or another State.
[3] Includes fresh fillets of cod, "lingcod," and rockfishes; frozen steaks of cod and salmon; and fresh-shucked oysters and bay scallops.
[4] This item has been included with "Miscellaneous."
[5] Includes green salted cod in process, partly boned; spiced and pickled herring; salmon bellies; and sturgeon eggs for caviar.
[6] Includes salted sablefish, and salmon, and sturgeon eggs for caviar.
[7] Includes salted barracuda, black sea bass, cabrilla, pilchards, tuna, and yellowtail; pickled and spiced herring; boneless and absolutely boneless salted cod; green salted cod in process, partly boned; and mild-cured shad.
[8] Includes smoked salmon, shad, smelt, and kippered sturgeon.
[9] Includes smoked chub, mackerel, sablefish, swordfish, and tuna.
[10] Includes canned salted cod, shad roe, hard clam chowder, and hard clams steamed in the shell.
[11] Includes canned smoked salmon, salmon eggs for bait, kippered sturgeon, whole razor clams, and razor clam juice.
[12] Includes pilchard, salmon, and salmon-egg meal.
[13] Includes abalone and miscellaneous fish meal.
[14] Includes pilchard and salmon oils, and miscellaneous liver oils.
[15] Includes whale, sperm, and miscellaneous fish and liver oils.
[16] Includes smoked herring bloaters and kelp products.
[17] Includes fresh fillets of flounders, "lingcod," and rockfishes; fresh-shucked hard clams; salmon and salmon-egg meal; salmon oil; crushed oyster shells for poultry feed and lime; and marine-shell novelties.
[18] Includes fresh-shucked eastern, Japanese, and native oysters, canned shad roe, dried shrimp, liquid glue, kelp products, oyster-shell lime, and marine-shell novelties.

NOTE.—The total value of manufactured products in the Pacific Coast States was as follows: By manufacturing establishments, $52,498,170; and by fishermen, $232,009. Some of the above products may have been imported from another State or foreign country; therefore, they cannot be correlated directly with the catch within the State. All of the persons engaged in the preparation of fishermen's manufactured products have been included as fishermen.

WASHINGTON

Fisheries of Washington, 1936

CATCH: BY DISTRICTS

Species	Puget Sound district		Coastal district		Columbia River district	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Carp					87,300	$2,382
Cod [1]	7,771,300	$122,866				
Flounders:						
"Sole"	4,503,200	91,438	20,300	$508		
Other	291,200	6,435				
Grayfish	330,700	764				
Halibut	24,061,000	2,067,103	12,500	776	17,400	1,455
Herring	989,700	9,400				
"Lingcod"	1,506,400	39,561	53,100	856	6,900	196
Perch	101,600	3,180	1,000	30		
Pilchard or sardine	6,600	99	[2] 13,107,800	[2] 65,539		
Rockfishes	533,100	16,705	17,700	239	16,100	425
Sablefish	2,577,800	102,124			189,200	6,481
Salmon:						
Blueback, red, or sockeye	3,179,200	272,464	192,600	20,269	132,900	14,619
Chinook or king	7,260,700	511,932	1,733,300	135,558	3,995,100	318,606

[1] Nearly all of the cod were taken off Alaska.
[2] The Washington coast pilchard fishery was inaugurated in 1936 as the result of legislation revising the State tax to permit the use of this fish for reduction purposes.

Fisheries of Washington, 1936—Continued

CATCH: BY DISTRICTS—Continued

Species	Puget Sound district		Coastal district		Columbia River district	
FISH—continued						
Salmon—Continued.	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Chum or keta	8,581,300	$172,376	2,064,500	$24,389	586,700	$5,867
Humpback or pink	123,800	2,482				
Silver or coho	6,117,400	304,410	2,519,900	119,040	939,600	42,316
Shad					57,400	1,722
Smelt:						
Eulachon					2,247,600	55,628
Surf or silver	505,800	31,227	66,100	2,710		
Steelhead trout			[3] 49,600	[3] 3,721	402,600	20,452
Sturgeon			38,300	2,373	41,100	1,120
Total	68,440,800	3,754,566	19,876,700	376,008	8,719,900	471,269
SHELLFISH, ETC.						
Crabs	386,800	21,276	1,394,100	107,067		
Shrimp	101,600	13,208				
Clams:						
Hard:						
Butter	428,700	26,792				
Little neck	449,100	37,423				
Razor			860,200	128,013		
Octopus	100,300	4,092				
Oysters, market:						
Eastern			1,300	337		
Japanese	952,000	63,926	5,354,300	382,451		
Native	299,500	205,004	5,300	2,477		
Scallops, bay	21,800	5,128				
Squid	16,300	929				
Trepang	9,700	387				
Total	2,765,800	378,165	7,615,200	620,345		
Grand total	71,206,600	4,132,731	27,491,900	996,353	8,719,900	471,269

[3] Steelhead trout shown for the coastal district of Washington were taken on Indian reservations.

Fisheries of the Puget Sound district of Washington, 1936

OPERATING UNITS: BY GEAR

Item	Purse seines			Haul seines	Gill nets		Lines		Pound nets [2]	Brush weirs
	Salmon	Sardine [1]	Herring		Drift	Set [2]	Trawl, set, and hand	Troll		
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	1,344	354	7	36			1,234	284		
On boats and shore	8			528	346	6	112	310	4	8
Total	1,352	354	7	564	346	6	1,346	594	4	8
Vessels:										
Motor	170	34	2	9			153	150		
Net tonnage	3,588	1,617	34	84			4,294	1,136		
Sail							3			
Net tonnage							1,346			
Total vessels	170	34	2	9			156	150		
Total net tonnage	3,588	1,617	34	84			5,640	1,136		
Boats:										
Motor	2			110	323	6	58	207	2	4
Other				96			36			4
Accessory boats	172	34	2				64			
Apparatus:										
Number	172	34	2	196	323	6	27,571	1,790	2	8
Length, yards	94,300	12,716	234	14,142						
Square yards					487,730	1,440				
Hooks							568,190	7,912		

[1] Operated in the Washington and Oregon coasts pilchard fishery. See separate sections for catch statistics.
[2] Fished only on Indian reservations.

Fisheries of the Puget Sound district of Washington, 1936—Continued

OPERATING UNITS: BY GEAR—Continued

Item	Dip nets	Reef nets	Beam trawls	Otter trawls	Traps		Tongs and rakes, oyster	Dredges, oyster	Shovels	Total, exclusive of duplication
					Crab	Octopus				
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels			18	122				3		3,321
On boats and shore	31	76	2	32	114	30	150		386	1,940
Total	31	76	20	154	114	30	150	3	386	5,261
Vessels:										
Motor			9	37				1		511
Net tonnage			83	533				12		10,421
Sail										3
Net tonnage										1,346
Total vessels			9	37				1		514
Total net tonnage			83	533				12		11,767
Boats:										
Motor	22	23	1	12	95	12	38			810
Other	8	46			19	18	96			303
Accessory boats										265
Apparatus:										
Number	31	23	10	49	3,765	570	110	2	386	
Yards at mouth			66	675				2		

CATCH: BY GEAR

Species	Purse seines		Haul seines		Gill nets			
					Drift		Set [1]	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod			2,200	$43				
Flounders, other than "sole"			3,900	86				
Herring	113,800	$1,097	25,500	434				
"Lingcod"	400	8	3,300	63				
Perch			97,900	3,064				
Pilchard or sardine			6,600	99				
Rockfishes	300	5	16,300	424				
Salmon: [4]								
Blueback, red, or sockeye	2,904,700	248,933			134,100	$11,492		
Chinook or king	531,500	23,014	1,000	45	1,358,100	73,337	5,200	$236
Chum or keta	5,716,300	113,783	1,300	29	2,683,500	56,109	14,100	192
Humpback or pink	122,000	2,440						
Silver or coho	2,864,400	121,403	100	5	614,700	31,964	12,700	472
Smelt, surf or silver	15,800	847	490,000	30,380				
Total	12,269,200	511,530	648,100	34,672	4,790,400	172,902	32,000	900
SHELLFISH, ETC.								
Octopus			400	16				
Squid			16,300	929				
Total			16,700	945				
Grand total	12,269,200	511,530	664,800	35,617	4,790,400	172,902	32,000	900

See footnotes at end of table.

Fisheries of the Puget Sound district of Washington, 1936—Continued

CATCH: BY GEAR—Continued

Species	Lines				Pound nets [1]		Brush weirs	
	Trawl, set, and hand [2]		Troll					
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod	[3] 7,368,200	$114,404	100	$2				
Flounders, "sole"	2,400	72						
Grayfish	330,700	764						
Halibut	24,019,300	2,064,432	35,800	2,294				
Herring							843,600	$7,761
"Lingcod"	1,084,000	30,878	62,800	1,068				
Perch	200	6						
Rockfishes	439,100	14,325	18,900	284				
Sablefish	2,554,800	101,495						
Salmon: [4]								
Blueback, red, or sockeye			600	59	6,900	$591		
Chinook or king			5,110,400	403,722	237,100	10,788		
Chum or keta			1,200	14	129,400	1,765		
Humpback or pink			1,600	38				
Silver or coho			2,507,000	146,158	30,700	1,142		
Total	35,798,700	2,326,376	7,738,400	553,639	404,100	14,286	843,600	7,761
SHELLFISH, ETC.								
Octopus	200	8						
Grand total	35,798,900	2,326,384	7,738,400	553,639	404,100	14,286	843,600	7,761

Species	Dip nets		Reef nets		Beam trawls		Otter trawls	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod							400,800	$8,417
Flounders:								
"Sole"							4,500,800	91,366
Other							287,300	6,349
Halibut							5,900	377
Herring	6,800	$108						
"Lingcod"							355,900	7,544
Perch							3,500	110
Rockfishes							58,500	1,667
Sablefish							23,000	629
Salmon: [4]								
Blueback, red or sockeye			132,900	$11,389				
Chinook or king			17,400	790				
Chum or keta			35,500	484				
Humpback or pink			200	4				
Silver or coho			87,800	3,266				
Total	6,800	108	273,800	15,933			5,635,700	116,459
SHELLFISH, ETC.								
Shrimp					101,600	$13,208		
Octopus							4,500	184
Scallops, bay [5]					21,800	5,128		
Trepang					9,700	387		
Total					133,100	18,723	4,500	184
Grand total	6,800	108	273,800	15,933	133,100	18,723	5,640,200	116,643

See footnotes at end of table.

Fisheries of the Puget Sound district of Washington, 1936—Continued

CATCH: BY GEAR—Continued

Species	Traps				Dredges, tongs, and rakes		Shovels	
	Crab		Octopus					
SHELLFISH, ETC.	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs [5]	386, 800	$21, 276						
Clams, hard: [6]								
Butter							428, 700	$26, 792
Little neck							449, 100	37, 423
Octopus			95, 200	$3, 884				
Oysters, market: [7]								
Japanese					952, 000	$63, 926		
Native					299, 500	205, 004		
Total	386, 800	21, 276	95, 200	3, 884	1, 251, 500	268, 930	877, 800	64, 215

[1] Fished only on Indian reservations.
[2] In addition, the vessels of the Pacific coast halibut fleet landed approximately 655,000 pounds of halibut, sablefish, and "lingcod" livers at Seattle, valued at $295,000.
[3] These cod were taken off Alaska.
[4] Statistics on the catch of salmon except those taken by troll lines, are reported to the State in number rather than pounds. The factors used in the above table for converting number of salmon to weight in pounds were as follows: Blueback, red, or sockeye, 7 pounds; chinook or king, 22 pounds; chum or keta, 11 pounds; humpback or pink, 5 pounds; and silver or coho, 8 pounds.
[5] The weight of crabs shown is based on an average of 20 pounds per dozen.
[6] Statistics on hard clams are based on yields of 28 percent edible meats for butter clams and 24 percent for little neck clams.
[7] Statistics on oysters shown are based on yields of 18 percent edible meats for native oysters and 10 percent for Japanese oysters.
[8] The weight of bay scallops is based on a yield of 17 percent edible meat.

Fisheries of the coastal district of Washington, 1936

OPERATING UNITS: BY GEAR [1]

Item	Haul seines	Gill nets		Lines, troll	Dip nets	Traps, crab	Tongs and rakes, oyster	Dredges, oyster	Shovels	Total, exclusive of duplication
		Drift	Set							
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels				52		12		8		68
On boats and shore	22	228	110	132	60	82	235		3, 288	3, 962
Total	22	228	110	184	60	94	235	8	3, 288	4, 030
Vessels, motor				28		6		2		34
Net tonnage				201		55		13		252
Boats:										
Motor		188	78	83	10	49	62			412
Other	4		32				150	2		184
Apparatus:										
Number	4	188	110	555	60	3, 610	190	4	3, 288	
Length, yards	280									
Square yards		358, 608	27, 500							
Yards at mouth								8		
Hooks				2, 498						

[1] In addition a combined fleet of 16 Puget Sound and California purse seine vessels operated in the Washington coast pilchard fishery. These vessels were manned by a total of 163 fishermen and had an aggregate capacity of 654 net tons. Of the total vessels 15 were from Puget Sound and 1 from California. For detailed statistics regarding the operating units in this fishery refer to the gear tables in the Puget Sound and California sections of this report.

Fisheries of the coastal district of Washington, 1936—Continued

CATCH: BY GEAR

Species	Purse seines		Haul seines [1]		Gill nets			
					Drift		Set [2]	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Perch			1,000	$30				
Pilchard or sardine	13,107,800	$65,539						
Salmon: [3]								
Blueback, red, or sockeye							185,400	$19,512
Chinook or king					472,100	$24,078	165,400	6,283
Chum or keta					1,022,300	12,063	1,036,900	12,235
Silver or coho			47,100	2,117	594,300	29,714	539,100	24,257
Smelt, surf or silver			30,200	1,238				
Steelhead trout [4]							49,600	3,721
Sturgeon					38,300	2,373		
Total	13,107,800	65,539	78,300	3,385	2,127,000	68,228	1,976,400	66,008

Species	Lines, troll		Dip nets		Otter trawls	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders, "sole"					20,300	$508
Halibut	12,500	$776				
"Lingcod"	53,100	856				
Rockfishes	17,700	239				
Salmon: [3]						
Blueback, red, or sockeye			7,200	$757		
Chinook or king	1,095,800	105,197				
Chum or keta	5,300	91				
Silver or coho	1,339,400	62,952				
Smelt, surf or silver			35,900	1,472		
Total	2,523,800	170,111	43,100	2,229	20,300	508

Species	Traps		Dredges, tongs, and rakes		Shovels	
SHELLFISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs [5]	1,394,100	$107,067				
Clams, razor [6]					860,200	$128,013
Oysters, market: [7]						
Eastern			1,300	$337		
Japanese			5,354,300	382,451		
Native			5,300	2,477		
Total	1,394,100	107,067	5,360,900	385,265	860,200	128,013

[1] The salmon were caught by Indians fishing on their reservations.
[2] Fished by Indians on their reservations.
[3] Statistics on the the catch of salmon except those taken by troll lines are reported to the State in number rather than pounds. The factors used in the above table for converting number of salmon to weight in pounds were as follows: Blueback, red, or sockeye, 4.75 pounds; chinook or king, 20 pounds; chum or keta, 11 pounds; silver or coho, 10 pounds; and steelhead trout, 10 pounds.
[4] Steelhead trout shown in this table were taken on Indian reservations.
[5] The weight of crabs shown is based on an average of 22 pounds per dozen.
[6] The weight of razor clams shown is in pounds of edible meats, based on a yield of 42 percent of the round weight.
[7] The statistics on oysters used in this table are based on a yield of 14 percent of edible meats for Japanese and native oysters, and 13 percent for eastern oysters.

Fisheries of the Columbia River district of Washington, 1936

OPERATING UNITS: BY GEAR

Item	Haul seines	Gill nets, drift	Lines		Dip nets	Total, exclusive of duplication
			Trawl and set	Troll		
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels			7	8		15
On boats and shore	6	646	48	69	219	911
Total	6	646	55	77	219	926
Vessels, motor			2	4		6
Net tonnage			31	34		65
Boats:						
Motor	2	484	38	40	105	628
Other	2		10		6	18
Apparatus:						
Number	2	484	344	204	219	
Length, yards	251					
Square yards		1,339,712				
Hooks			11,016	714		

CATCH: BY GEAR

Species	Haul seines		Gill nets, drift		Lines				Dip nets	
					Trawl and set		Troll			
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Carp	87,300	$2,382								
Halibut					17,400	$1,455				
"Lingcod"					6,900	196				
Rockfishes					16,100	425				
Sablefish					189,200	6,481				
Salmon:										
Blueback, red, or sockeye			28,800	$3,168					104,100	$11,451
Chinook or king			3,414,300	271,095			332,100	$27,764	248,700	19,747
Chum or keta			586,700	5,867						
Silver or coho			339,100	14,513			600,500	27,803		
Shad			57,400	1,722						
Smelt, eulachon			99,200	4,067					2,148,400	51,561
Steelhead trout			359,100	18,242			1,200	61	42,300	2,149
Sturgeon			29,000	757	12,100	363				
Total	87,300	2,382	4,913,600	319,431	241,700	8,920	933,800	55,628	2,543,500	84,908

OREGON

Fisheries of Oregon, 1936

CATCH: BY DISTRICTS

Species	Columbia River district		Coastal district	
FISH	*Pounds*	*Value*	*Pounds*	*Value*
Cod	600	$9		
Flounders:				
"Sole"	140,800	2,819	7,600	$165
Other	5,100	81	500	10
Halibut	163,800	13,176	113,500	8,743
Herring			23,100	268
"Lingcod"	104,500	2,568	64,200	1,571
Perch			11,400	241
Pilchard or sardine			28,393,300	141,966
Rockfishes	61,000	1,693	60,100	1,629
Sablefish	160,400	4,938	110,100	3,218
Salmon:				
Blueback, red, or sockeye	284,700	30,223		
Chinook or king	12,519,100	996,721	2,001,400	142,003
Chum or keta	556,800	5,568	1,320,300	14,523
Silver or coho	1,589,500	70,778	3,310,200	143,151
Shad	249,400	7,479	416,100	12,483

Fisheries of Oregon, 1936—Continued

CATCH: BY DISTRICTS—Continued

Species	Columbia River district		Coastal district	
FISH—continued				
Smelts:	*Pounds*	*Value*	*Pounds*	*Value*
Eulachon	312,900	$7,520		
Other			4,700	$161
Steelhead trout	1,904,400	96,745	336,700	23,232
Striped bass			29,100	1,950
Sturgeon	100,700	2,809	2,200	66
Tuna, albacore	25,600	1,778	2,000	130
Total	18,179,300	1,244,905	36,206,500	495,510
SHELLFISH				
Crabs			3,081,600	218,511
Crawfish, fresh water	86,900	9,559		
Clams:				
Razor			64,500	12,286
Mixed			85,800	6,541
Oysters, market:				
Japanese			28,900	2,475
Native			7,900	5,283
Total	86,900	9,559	3,268,700	245,096
Grand total	18,266,200	1,254,464	39,475,200	740,606

Fisheries of the Columbia River district of Oregon, 1936

OPERATING UNITS: BY GEAR

Item	Purse seines, pilchard[1]	Haul seines	Gill nets		Lines		Pound nets	Dip nets	Otter trawls	Traps, crawfish	Total, exclusive of duplication
			Drift, salmon	Set, salmon	Trawl and set	Troll					
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	12				20	65			3		97
On boats and shore		506	1,100	71	79	157	64	252		34	2,174
Total	12	506	1,100	71	99	222	64	252	3	34	2,271
Vessels, motors	1				5	34			1		40
Net tonnage	105				77	257			13		439
Boats:											
Motor		23	755	65	71	128	30	10		23	1,054
Other		42		6	8		30	6		11	99
Accessory boats	1										1
Apparatus:											
Number	1	42	755	123	625	844	38	252	1	1,534	
Length, yards	500	22,700									
Square yards			2,409,205	34,440							
Yards at mouth									24		
Hooks					18,845	3,580					

[1] Operated in the pilchard fishery of the Oregon coast and California.

Fisheries of the Columbia River district of Oregon, 1936—Continued

CATCH: BY GEAR

Species	Haul seines		Gill nets				Lines	
			Drift		Set		Trawl and set	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders:								
"Sole"							23,400	$679
Other							200	3
Halibut							161,100	12,994
"Lingcod"							85,900	2,159
Rockfishes							54,900	1,621
Sablefish							160,400	4,938
Salmon:								
Blueback, red, or sockeye	47,700	$5,247	113,500	$12,031	4,900	$519		
Chinook or king	2,261,100	179,531	7,779,800	617,716	74,400	5,907		
Chum or keta	62,500	625	464,300	4,643	100	1		
Silver or coho	92,800	3,972	544,500	23,305	400	17		
Shad	110,100	3,300	137,900	4,137	100	3		
Smelt, eulachon			210,400	5,470				
Steelhead trout	730,700	37,119	733,500	37,262	14,000	713		
Sturgeon	2,400	67	65,300	1,759	300	9	31,900	957
Total	3,307,300	229,861	10,049,200	706,323	94,200	7,169	517,800	23,351

Species	Lines—Contd.		Pound nets		Dip nets		Otter trawls		Traps	
	Troll									
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod							600	$9		
Flounders:										
"Sole"							117,400	2,140		
Other							4,900	78		
Halibut	500	$40					2,200	142		
"Lingcod"	5,400	146					13,200	263		
Rockfishes							6,100	72		
Salmon:										
Blueback, red, or sockeye			15,300	$1,683	103,300	$10,743				
Chinook or king	643,900	53,831	472,100	37,485	1,287,800	102,251				
Chum or keta			29,900	299						
Silver or coho	784,800	36,336	167,000	7,148						
Shad			1,300	39						
Smelt, eulachon					102,500	2,050				
Steelhead trout	200	10	192,700	9,789	233,300	11,852				
Sturgeon			500	8	300	9				
Tuna, albacore	25,600	1,778								
Total	1,460,400	92,141	878,800	56,451	1,727,200	126,905	144,400	2,704		
SHELLFISH										
Crawfish, fresh water									86,900	$9,559
Grand total	1,460,400	92,141	878,800	56,451	1,727,200	126,905	144,400	2,704	86,900	9,559

Fisheries of the coastal district of Oregon, 1936

OPERATING UNITS: By gear [1]

Item	Haul seines	Gill nets		Lines		Otter trawls	Traps, crab	Tongs and rakes, oyster	Shovels	Total, exclusive of duplication
		Drift	Set	Trawl and set	Troll					
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:										
On vessels				8	27	3	10			41
On boats and shore	22	498	373	29	145		274	8	194	1,415
Total	22	498	373	37	172	3	284	8	194	1,456
Vessels, motor				2	15	1	5			20
Net tonnage				24	106	13	41			157
Boats:										
Motor	7	451	248	29	119		268	2		1,002
Other	7		102					3	18	130
Apparatus:										
Number	7	451	936	203	679	1	17,745	8	194	
Length, yards	1,040									
Square yards		635,459	336,960							
Yards at mouth						20				
Hooks				6,380	3,055					

CATCH: By gear

Species	Purse seines, pilchard		Haul seines		Gill nets, drift and set		Lines	
							Trawl and set	
FISH								
Flounders:	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
"Sole"							3,700	$83
Other							400	8
Halibut							109,400	8,435
Herring			10,400	$77	12,700	$191		
"Lingcod"							46,100	1,134
Perch			10,300	219	1,100	22		
Pilchard or sardine	28,393,300	$141,966						
Rockfishes							47,500	1,227
Sablefish							110,100	3,218
Salmon:								
Chinook or king					1,209,800	76,459		
Chum or keta					1,320,300	14,523		
Silver or coho					2,339,100	99,646		
Shad					416,100	12,483		
Smelts			4,000	138	700	23		
Steelhead trout					336,700	23,232		
Striped bass					29,100	1,950		
Sturgeon					2,200	66		
Total	28,393,300	141,966	24,700	434	5,667,800	228,595	317,200	14,105

[1] In addition a combined fleet of 59 Oregon, Washington, and California purse seine vessels operated in the Oregon coast pilchard fishery. These vessels were manned by a total of 612 fishermen and had an aggregate capacity of 3,226 net tons. Of the total vessels, 1 was from the Columbia River district of Oregon, 23 from Washington, and 35 were from California. For detailed statistics regarding the operating units in this fishery refer to the gear tables in the Oregon Columbia River, Washington and California sections of this report.

Fisheries of the coastal district of Oregon, 1936—Continued

CATCH: BY GEAR—Continued

Species	Lines—Contd. Troll		Otter trawls		Traps		Tongs and rakes		Shovels	
FISH										
Flounders:	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
"Sole"			3,900	$82						
Other			100	2						
Halibut	4,100	$308								
"Lingcod"	11,900	283	6,200	154						
Rockfishes	11,800	366	800	36						
Salmon:										
Chinook or king	791,600	65,544								
Silver or coho	971,100	43,505								
Tuna, albacore	2,000	130								
Total	1,792,500	110,136	11,000	274						
SHELLFISH										
Crabs					3,081,600	$218,511				
Clams:										
Razor [1]									64,500	$12,286
Mixed [2]									85,800	6,541
Oysters, market:										
Japanese							28,900	$2,475		
Native							7,900	5,283		
Total					3,081,600	218,511	36,800	7,758	150,300	18,827
Grand total	1,792,500	110,136	11,000	274	3,081,600	218,511	36,800	7,758	150,300	18,827

[1] The weight of razor clams is that of edible meats, based on a yield of 42 percent of the round weight.
[2] Mixed clams consist principally of eastern soft-shell clams. The weight shown is that of edible meats, based on a yield of 21 percent of the round weight.

CALIFORNIA

Fisheries of California, 1936

CATCH: BY DISTRICTS

Species	Northern district		San Francisco district [1]		Monterey district	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Anchovies	2,000	$35	133,000	$1,330	30,200	$387
Carp			108,700	1,346		
Catfish			301,700	36,769	2,900	392
Cod [1]			5,150,100	79,800		
Flounders:						
"California halibut"			9,600	1,346	47,100	4,468
"Sole"	2,082,200	99,374	4,917,000	284,873	944,200	48,561
Other	261,000	12,947	982,800	63,642	106,800	5,237
Grayfish	900	5	154,700	773	17,900	234
Hake	500	5	39,000	390	7,200	72
Halibut	524,000	39,115				
Hardhead			106,700	5,485		
Herring	5,800	49	831,600	3,883	1,300	17
Horse mackerel					30,800	2,041
Kingfish			12,800	385	209,900	7,645
"Lingcod"	289,200	10,128	301,500	12,060	161,300	7,897
Mackerel	500	12	44,500	890	5,418,400	62,086
Perch	13,400	394	95,700	3,756	45,300	1,836
Pilchard or sardine			789,055,500	3,836,388	402,943,000	1,940,828
Pompano					300	175
Rockfishes	318,000	10,925	635,200	27,646	2,712,500	89,268
Sablefish	585,200	18,175	36,600	1,189	225,000	4,980
Salmon	3,479,800	259,754	1,395,800	88,054	144,900	12,694
Sculpin			6,300	126	11,800	124
Sea bass, white			4,500	800	7,000	716
Shad			2,273,000	45,760		
Skates	7,200	72	280,200	2,802	53,000	687
Smelt	16,700	609	380,500	13,658	135,200	5,994
Splittail			29,300	528		

[1] The catch of cod was taken off Alaska.

Fisheries of California, 1936—Continued

CATCH: BY DISTRICTS—Continued

Species	Northern district		San Francisco district		Monterey district	
FISH—continued	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Squawfish			500	$24		
Suckers			48,100	706		
Tomcod			4,200	83		
Tuna and tunalike fishes:						
Albacore					42,500	$3,761
Bonito					500	30
Whitebait	177,500	$7,294	13,200	824	7,100	615
Other fish	56,600	592	99,900	1,004	13,900	145
Total	7,820,500	459,485	807,452,200	4,516,320	413,320,000	2,200,890
SHELLFISH, ETC.						
Crabs	229,900	16,577	2,075,600	237,827	6,200	556
Shrimp			2,240,800	31,640	1,900	405
Abalone			6,700	673	315,100	58,161
Clams:						
Hard	8,200	839	1,600	438		
Pismo					5,100	1,240
Soft			29,100	6,056		
Octopus	800	34	12,300	736	48,700	2,825
Oysters, market:						
Eastern			58,900	18,320		
Japanese			40,200	7,535	1,200	278
Native			4,300	1,078		
Squid			2,800	166	933,200	23,376
Other shellfish					100	8
Total	238,900	17,450	4,472,300	304,469	1,311,500	86,849
WHALE PRODUCTS						
Whale meat			1,600,000	32,000		
Whale oil			1,189,600	49,952		
Total			2,789,600	81,952		
Grand total	8,059,400	476,935	814,714,100	4,902,741	414,631,500	2,287,739

Species	San Pedro district					
	Off California		Off Latin America		Total	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Anchovies	29,900	$435			29,900	$435
Barracuda	2,025,900	85,850	305,300	$25,305	2,331,200	111,155
Cabrilla			72,800	2,796	72,800	2,796
Flounders:						
"California halibut"	631,100	51,746	182,900	14,859	814,000	66,605
"Sole"	381,300	11,179	100	8	381,400	11,187
Other	8,600	1,418			8,600	1,418
Flyingfish	55,600	2,040			55,600	2,040
Grayfish	238,100	7,619	8,200	349	246,300	7,968
Groupers			20,700	1,200	20,700	1,200
Hake	4,100	81			4,100	81
Herring	200	8			200	8
Horse mackerel	4,506,600	35,340			4,506,600	35,340
Kingfish	427,900	7,813			427,900	7,813
"Lingcod"	300	12	300	19	600	31
Mackerel	84,338,100	774,435			84,338,100	774,435
Marlin	14,700	425			14,700	425
Mullet	6,700	535			6,700	535
Perch	53,000	3,425			53,000	3,425
Pilchard or sardine	252,937,000	1,049,604			252,937,000	1,049,604
Pompano	7,100	3,348			7,100	3,348
Rock bass	207,000	12,581	9,700	604	216,700	13,185
Rockfishes	671,700	24,467	11,400	544	683,100	25,011
Rudderfishes	43,900	2,296			43,900	2,296
Sablefish	172,700	6,646	13,900	812	186,600	7,458
Salmon	1,000	96			1,000	96
Sculpin	106,300	8,716			106,300	8,716
Sea bass:						
Black	14,000	723	281,200	16,968	295,200	17,691
White	484,200	33,382	18,400	2,013	502,600	35,395
Sheepshead	109,200	3,827	2,000	67	111,200	3,894
Skates	28,800	431	1,700	45	30,500	476

Fisheries of California, 1936—Continued

CATCH: BY DISTRICTS—Continued

Species	San Pedro district					
	Off California		Off Latin America		Total	
FISH—continued	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Smelt	299,200	$10,944			299,200	$10,944
Spanish mackerel			16,100	$952	16,100	952
Swordfish	461,800	53,909	1,700	177	463,500	54,086
Tuna, and tunalike fishes:						
Albacore	911,800	84,811			911,800	84,811
Bluefin	13,630,700	667,532	4,021,300	192,785	17,652,000	860,317
Bonito	1,280,400	37,513	3,604,700	114,029	4,885,100	151,542
Skipjack or striped tuna	5,134,300	229,053	4,299,400	184,471	9,433,700	413,524
Yellowfin	640,300	34,473	19,660,700	1,045,669	20,301,000	1,080,142
Whitefish	16,500	952	5,700	317	22,200	1,269
Yellowtail	184,100	7,868	1,963,700	62,560	2,147,800	70,428
Other fish	7,000	248	100	4	7,100	252
Total	370,071,100	3,255,781	34,502,000	1,666,553	404,573,100	4,922,334
SHELLFISH, ETC.						
Crabs	16,200	484			16,200	484
Sea crawfish or spiny lobster	334,100	55,461	35,100	6,450	369,200	61,911
Abalone	338,600	33,877			338,600	33,877
Clams:						
Hard	5,100	1,248			5,100	1,248
Pismo	47,300	9,482			47,300	9,482
Octopus	600	81			600	81
Squid	9,500	315			9,500	315
Turtles	500	24			500	24
Other shellfish	300	5			300	5
Total	752,200	100,977	35,100	6,450	787,300	107,427
Grand total	370,823,300	3,356,758	34,537,100	1,673,003	405,360,400	5,029,761

Species	San Diego district					
	Off California		Off Latin America		Total	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Barracuda	221,900	$8,177	424,700	$21,420	646,600	$29,597
Cabrilla			124,100	3,879	124,100	3,879
Carp	100	5			100	5
Flounders:						
"California halibut"	95,300	6,855	62,400	40,695	718,700	47,550
"Sole"	100	4			100	4
Grayfish	45,900	426	6,100	103	52,000	529
Groupers			39,800	1,374	39,800	1,374
Herring	1,500	18			1,500	18
Horse mackerel	60,800	363	1,200	7	62,000	370
Kingfish	1,300	34	100	5	1,400	39
"Lingcod"	2,000	46	3,600	136	5,600	182
Mackerel	9,026,600	78,505	1,714,100	15,787	10,740,700	94,292
Marlin	1,600	78	300	12	1,900	90
Mullet	3,900	252			3,900	252
Perch	300	14	100	4	400	18
Pilchard or sardine	15,855,300	64,463	700	12	15,856,000	64,475
Pompano	100	21	400	51	500	72
Rock bass	117,400	4,975	82,100	3,356	199,500	8,331
Rockfishes	153,700	6,969	98,100	4,770	251,800	11,739
Sablefish	1,600	24	500	20	2,100	44
Sculpin	3,700	509	700	50	4,400	559
Sea bass:						
Black	5,800	286	96,600	4,358	102,400	4,644
White	69,400	5,892	224,500	18,869	293,900	24,761
Sheepshead	6,800	265	10,600	374	17,400	639
Skates	9,100	103	2,000	18	11,100	121
Smelt	7,600	215	2,000	121	9,600	336
Spanish mackerel			1,900	56	1,900	56
Swordfish	90,200	7,964	23,700	2,143	113,900	10,107
Tuna, and tunalike fishes:						
Albacore	2,400	223			2,400	223
Bluefin	177,900	8,649	1,095,000	53,366	1,272,900	62,015
Bonito	935,800	27,098	1,394,500	42,796	2,330,300	69,894
Skipjack or striped tuna	3,322,400	149,490	14,236,100	628,120	17,558,500	777,610
Yellowfin	127,000	7,034	57,924,700	3,052,035	58,051,700	3,059,069

Fisheries of California, 1936—Continued

CATCH: BY DISTRICTS—Continued

Species	San Diego district					
	Off California		Off Latin America		Total	
FISH—continued	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Whitefish	10,300	$536	14,000	$718	24,300	$1,254
Yellowtail	69,700	2,946	7,875,000	225,178	7,944,700	228,124
Other fish	200	5	800	21	1,000	26
Total	30,427,700	382,444	86,021,400	4,119,854	116,449,100	4,502,298
SHELLFISH, ETC.						
Sea crawfish or spiny lobster	80,100	12,692	885,700	73,823	965,800	86,515
Turtles			2,200	97	2,200	97
Total	80,100	12,692	887,900	73,920	968,000	86,612
Grand total	30,507,800	395,136	86,909,300	4,193,774	117,417,100	4,588,910

CATCH: BY WATERS

Species	Off California [1]		Off Latin America	
FISH	*Pounds*	*Value*	*Pounds*	*Value*
Anchovies	195,100	$2,187		
Barracuda	2,247,800	94,027	730,000	$46,725
Cabrilla			196,900	6,675
Carp	108,800	1,351		
Catfish	304,600	37,161		
Cod [1]	5,150,100	79,800		
Flounders:				
"California halibut"	783,100	64,415	806,300	55,554
"Sole"	8,324,800	443,991	100	8
Other	1,359,200	83,244		
Flyingfish	55,600	2,040		
Grayfish	457,500	9,057	14,300	452
Groupers			60,500	2,574
Hake	50,800	548		
Halibut	524,000	39,115		
Hardhead	106,700	5,485		
Herring	840,400	3,975		
Horse mackerel	4,598,200	37,744	1,200	7
Kingfish	651,900	15,877	100	5
"Lingcod"	754,300	30,143	3,900	155
Mackerel	98,828,100	915,928	1,714,100	15,787
Marlin	16,300	503	300	12
Mullet	10,600	787		
Perch	207,700	9,425	100	4
Pilchard or sardine	1,460,790,800	6,891,283	700	12
Pompano	7,500	3,544	400	51
Rock bass	324,400	17,556	91,800	3,960
Rockfishes	4,491,100	159,275	109,500	5,314
Rudderfishes	43,900	2,296		
Sablefish	1,021,100	31,014	14,400	832
Salmon	5,021,500	360,598		
Sculpin	128,100	9,475	700	50
Sea bass:				
Black	19,800	1,009	377,800	21,326
White	565,100	40,790	242,900	20,882
Shad	2,273,000	45,760		
Sheepshead	116,000	4,092	12,600	441
Skates	378,300	4,095	3,700	63
Smelt	839,200	31,420	2,000	121
Spanish mackerel			18,000	1,008
Splittail	29,300	528		
Squawfish	500	24		
Suckers	48,100	706		
Swordfish	552,000	61,873	25,400	2,320
Tomcod	4,200	83		

[1] The catch of cod was taken off Alaska.

Fisheries of California, 1936—Continued

CATCH: BY WATERS—Continued

Species	Off California		Off Latin America	
FISH—continued				
Tuna and tunalike fishes:	*Pounds*	*Value*	*Pounds*	*Value*
Albacore	956,700	$88,795		
Bluefin	13,808,600	676,181	5,116,300	$246,151
Bonito	2,216,700	64,641	4,999,200	156,825
Skipjack or striped tuna	8,456,700	378,543	18,535,500	812,591
Yellowfin	767,300	41,507	77,585,400	4,097,704
Whitebait	197,800	8,733		
Whitefish	26,800	1,488	19,700	1,035
Yellowtail	253,800	10,814	9,838,700	287,738
Other fish	177,600	1,994	900	25
Total	1,629,091,500	10,814,920	120,523,400	5,786,407
SHELLFISH, ETC.				
Crabs	2,327,900	255,444		
Sea crawfish or spiny lobster	414,200	68,153	920,800	80,273
Shrimp	2,242,700	32,045		
Abalone	660,400	92,711		
Clams:				
Hard	14,900	2,525		
Pismo	52,400	10,722		
Soft	29,100	6,056		
Octopus	62,400	3,676		
Oysters, market:				
Eastern	58,900	18,320		
Japanese	41,400	7,813		
Native	4,300	1,078		
Squid	945,500	23,857		
Turtles	500	24	2,200	97
Other shellfish	400	13		
Total	6,855,000	522,437	923,000	80,370
WHALE PRODUCTS				
Whale meat	1,600,000	32,000		
Whale oil	1,189,600	49,952		
Total	2,789,600	81,952		
Grand total	1,638,736,100	11,419,309	121,446,400	5,866,777

Fisheries of the northern district of California, 1936

OPERATING UNITS: BY GEAR

Item	Gill nets	Lines		Dip nets	Otter trawls	Traps, crab	Shovels	Total, exclusive of duplication
		Set and hand	Troll					
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels		15	27		3	2		31
On boats and shore	21	84	201	42	3	40	13	267
Total	21	99	228	42	6	42	13	298
Vessels, motor		6	15		1	1		16
Net tonnage		51	126		9	9		134
Boats, motor	14	67	176		1	37		188
Apparatus:								
Number	20	301	983	42	2	695	13	
Square yards	15,000							
Yards at mouth					20			
Hooks		33,789	4,274					

Fisheries of the northern district of California, 1936—Continued

CATCH: BY GEAR

Species	Gill nets		Lines			
			Set and hand		Troll	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Anchovies	2,000	$35				
Flounders:						
"Sole"			400	$12		
Other	12,400	421				
Halibut			475,600	32,301	2,300	$130
Herring	5,800	49				
"Lingcod"			184,100	6,685	15,600	312
Mackerel			500	12		
Perch	11,800	347				
Rockfishes			173,600	5,399	2,600	78
Sablefish			543,000	16,804		
Salmon					3,479,800	259,754
Smelt	14,000	531				
Other fish			5,700	78	1,400	19
Total	46,000	1,383	1,382,900	61,291	3,501,700	260,293
SHELLFISH, ETC.						
Octopus			800	34		
Grand total	46,000	1,383	1,383,700	61,325	3,501,700	260,293

Species	Dip nets		Paranzella nets and otter trawls		Traps		Shovels	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders:								
"Sole"			2,081,800	$99,362				
Other			248,600	12,526				
Grayfish			900	5				
Hake			500	5				
Halibut			46,100	6,684				
"Lingcod"			89,500	3,131				
Perch	1,200	$36	400	11				
Rockfishes			141,800	5,448				
Sablefish			42,200	1,371				
Skates			7,200	72				
Smelt	2,700	78						
Whitebait	177,500	7,924						
Other fish			49,500	495				
Total	181,400	7,408	2,708,500	129,110				
SHELLFISH								
Crabs					229,900	$16,577		
Clams, hard							8,200	$839
Total					229,900	16,577	8,200	839
Grand total	181,400	7,408	2,708,500	129,110	229,900	16,577	8,200	839

NOTE.—The catch by paranzella nets was made by fishermen from the San Francisco district.

Fisheries of the San Francisco district of California, 1936

OPERATING UNITS: BY GEAR

Item	Purse seines		Lampara and ring nets		Haul seines	Gill nets	
	Sardine	Tuna	Mackerel	Sardine		Drift, salmon	Drift, sea bass
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	212	34	9	124			
On boats and shore				25	7	196	4
Total	212	34	9	149	7	196	4
Vessels:							
Motor	19	3	1	11			
Net tonnage	1,223	215	14	130			
Boats:							
Motor				3	3	112	3
Other					1	2	1
Accessory boats	19	3	1	14			
Apparatus:							
Number	19	3	1	14	3	114	4
Length yards	7,731	1,750	360	4,275	567		
Square yards						377,980	8,400

Item	Gill nets—Con.		Lines		Fyke nets	Dip nets	Bag nets, shrimp	Paranzella nets
	Drift, shad	Other	Set and hand	Troll				
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels			84	47			23	95
On boats and shore	242	46	65	228	79	7	24	
Total	242	46	149	275	79	7	47	95
Vessels:								
Motor			1	21			5	18
Net tonnage			10	273			31	246
Sail			2					
Net tonnage			824					
Total vessels			3	21			5	18
Total net tonnage			834	273			31	246
Boats:								
Motor	137	26	27	225	44	1	6	
Other	2	2	18		19	1		
Accessory boats			72				3	
Apparatus:								
Number	139	45	759	1,388	1,938	7	11	9
Length, yards							8,080	
Square yards	500,882	68,775						
Hooks			39,012	6,579				
Yards at mouth								150

Fisheries of the San Francisco district of California, 1936—Continued

OPERATING UNITS: By gear—Continued

Item	Beam trawls	Otter trawls	Traps, crab	Harpoons, whale	Rakes and tongs, oyster	Shovels	Abalone outfits	Total, exclusive of duplication
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels			1	16				541
On boats and shore	17	3	268		25	42	2	833
Total	17	3	269	16	25	42	2	1,374
Vessels:								
Steam				2				2
Net tonnage				41				41
Motor			1					53
Net tonnage			14					1,652
Sail								2
Net tonnage								824
Total vessels			1	2				57
Total net tonnage			14	41				2,517
Boats:								
Motor	17	1	267		10		1	534
Other					9	5		51
Accessory boats								108
Apparatus:								
Number	17	1	5,324	2	25	42	1	
Yards at mouth	113	10						

CATCH: By gear

Species	Purse seines		Lampara and ring nets		Haul seines		Gill nets	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Anchovies			70,000	$700	63,000	$630		
Carp					61,600	616	11,300	$175
Flounders, other			100	5	200	12	1,200	35
Hardhead					68,400	3,078		
Herring			3,000	14	515,700	2,408	312,900	1,461
Kingfish			5,600	169				
Mackerel			43,700	873				
Perch			100	4	25,500	1,019	70,100	2,733
Pilchard or sardine	758,286,600	$3,680,569	30,768,700	155,818			200	1
Salmon							948,300	54,488
Sea bass, white			400	58			4,100	742
Shad							2,273,000	45,760
Smelt			29,800	1,101	5,700	210	335,500	12,007
Splittail					22,100	221		
Squawfish							300	15
Suckers					41,900	419		
Tomcod			2,600	51				
Whitebait			1,100	66				
Other fish							100	2
Total	758,286,600	3,680,569	30,925,100	158,859	804,100	8,613	3,957,000	117,419

Species	Lines				Fyke nets		Dip nets	
	Set and hand		Troll					
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Carp					35,800	$555		
Catfish	12,000	$1,553			289,700	35,216		
Cod	5,150,100	79,800						
Eels	100	5						
Flounders:								
"California halibut"	300	46	400	$59				
"Sole"	3,400	148						
Other	2,600	275						
Grayfish	25,900	129						
Hardhead					38,300	2,407		
"Lingcod"	194,100	7,764	400	15				
Mackerel	500	11						
Rockfishes	312,200	13,942	200	7				
Sablefish	400	12						

Fisheries of the San Francisco district of California, 1936—Continued

CATCH: BY GEAR—Continued

Species	Lines				Fyke nets		Dip nets	
	Set and hand		Troll					
FISH—continued	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Salmon			447, 500	$33, 566				
Sculpin	6, 300	$126						
Smelt	500	25					9, 000	$315
Splittail					7, 200	$307		
Squawfish					200	9		
Suckers					6, 200	287		
Whitebait							12, 100	758
Other fish	100	1						
Total	5, 708, 500	103, 837	448, 500	33, 647	377, 400	38, 781	21, 100	1, 073
SHELLFISH, ETC.								
Octopus	11, 500	690						
Squid	300	17						
Total	11, 800	707						
Grand total	5, 720, 300	104, 544	448, 500	33, 647	377, 400	38, 781	21, 100	1, 073

Species	Bag nets		Paranzella nets		Beam trawls		Traps	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Flounders:								
"California halibut"			8, 900	$1, 241				
"Sole"			4, 913, 600	284, 725				
Other			978, 700	63, 315				
Grayfish			128, 800	644				
Hake			39, 000	390				
Kingfish			7, 200	216				
"Lingcod"			107, 000	4, 281				
Mackerel			300	6				
Rockfishes			322, 800	13, 697				
Sablefish			36, 200	1, 177				
Skates			280, 200	2, 802				
Tomcod			1, 600	32				
Other fish			99, 600	996				
Total			6, 923, 900	373, 522				
SHELLFISH, ETC.								
Crabs			12, 400	1, 428			2, 063, 200	$236, 399
Shrimp	1, 772, 400	$25, 026			468, 400	$6, 614		
Octopus			800	46				
Squid			2, 500	149				
Total	1, 772, 400	25, 026	15, 700	1, 623	468, 400	6, 614	2, 063, 200	236, 399
Grand total	1, 772, 400	25, 026	6, 939, 600	375, 145	468, 400	6, 614	2, 063, 200	236, 399

Species	Harpoons		Rakes and tongs		Shovels		Abalone outfits	
SHELLFISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Abalone							6, 700	$673
Clams:								
Hard					1, 600	$438		
Soft					29, 100	6, 056		
Oysters, market:								
Eastern			58, 900	$18, 320				
Japanese			40, 200	7, 535				
Native			4, 300	1, 078				
Total			103, 400	26, 933	30, 700	6, 494	6, 700	673
WHALE PRODUCTS								
Whale meat	1, 600, 000	$32, 000						
Whale oil	1, 189, 600	49, 952						
Total	2, 789, 600	81, 952						
Grand total	2, 789, 600	81, 952	103, 400	26, 933	30, 700	6, 494	6, 700	673

Fisheries of the Monterey district of California, 1936

OPERATING UNITS: BY GEAR

Item	Purse seines		Lampara and ring nets			Gill nets			
	Sardine	Tuna	Mackerel	Sardine	Other	Set, "California halibut"	Set, crab	Drift, sea bass	Other
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	412	46	46	198	35				
On boats and shore				191	117	26	13	19	38
Total	412	46	46	389	152	26	13	19	38
Vessels, motor	37	4	4	17	5				
Net tonnage	1,974	179	117	154	31				
Boats:									
Motor				17	17	18	9	14	23
Other									9
Accessory boats	37	4	4	34	22				
Apparatus:									
Number	37	4	4	34	22	18	9	14	44
Length, yards	12,006	2,347	1,900	10,363	4,500				
Square yards						55,395	30,960	33,152	48,809

Item	Lines		Otter trawls	Traps			Rakes and tongs	Shovels	Abalone outfits	Total, exclusive of duplication
	Set and hand	Troll		Crab	Octopus	Lobster				
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	4	6	16			2			68	652
On boats and shore	214	198	3	8	8		7	35	11	532
Total	218	204	19	8	8	2	7	35	79	1,184
Vessels, motor	3	4	3			1			14	66
Net tonnage	36	33	76			27			143	2,239
Boats:										
Motor	162	166	1	7	6		2		2	215
Other	17			1			3	11		34
Accessory boats										80
Apparatus:										
Number	859	868	4	122	92	35	7	35	16	
Yards at mouth			44							
Hooks	82,394	2,904								

CATCH: BY GEAR

Species	Purse seines		Lampara and ring nets		Gill nets	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Anchovies			14,000	$180	16,200	$207
Flounders:						
"California halibut"			700	66	31,800	3,017
"Sole"					21,500	786
Other					4,300	121
Grayfish					2,000	55
Herring			1,300	17		
Horse mackerel			29,400	1,948	600	40
Kingfish			81,100	2,954	111,600	4,065
"Lingcod"					3,200	157
Mackerel	63,700	$637	4,690,700	46,907	300	8
Perch			12,000	535	29,900	1,165
Pilchard or sardine	337,501,700	1,624,575	65,429,300	316,133	12,000	120
Pompano			300	175		
Rockfishes					2,700	93
Sculpin					2,500	26
Sea bass, white	100	10			6,800	696

Fisheries of the Monterey district of California, 1936—Continued

CATCH: BY GEAR—Continued

Species	Purse seines		Lampara and ring nets		Gill nets	
FISH—continued	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Skates					7,600	$131
Smelt			19,300	$842	100,400	4,475
Tuna, bonito	100	$6			300	18
Whitebait			7,100	615		
Total	337,565,600	1,625,228	70,285,200	370,372	353,700	15,180
SHELLFISH, ETC.						
Crabs					5,800	520
Octopus					300	17
Squid	1,200	30	930,100	23,298	1,900	48
Total	1,200	30	930,100	23,298	8,000	585
Grand total	337,566,800	1,625,258	71,215,300	393,670	361,700	15,765

Species	Lines				Fyke nets		Paranzella nets and otter trawls	
	Set and hand		Troll					
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Catfish					2,900	$392		
Flounders:								
"California halibut"	900	$85					13,700	$1,300
"Sole"	17,100	677					905,600	47,098
Other	20,900	997					81,600	4,119
Grayfish	500	14					15,400	165
Hake							7,200	72
Horse mackerel	800	53						
Kingfish	14,900	542					2,300	84
"Lingcod"	150,100	7,372	300	$15			7,700	353
Mackerel	663,700	14,534						
Perch	2,200	82					1,200	54
Rockfishes	2,612,700	85,033	100	3			97,000	4,139
Sablefish	207,800	4,464					17,200	516
Salmon			144,900	12,694				
Sculpin	9,300	98						
Sea bass, white	100	10						
Skates	6,200	107					39,200	449
Smelt	15,500	677						
Tuna, and tunalike fishes:								
Albacore			42,500	3,761				
Bonito	100	6						
Other fish	100	4					13,800	141
Total	3,722,900	114,755	187,800	16,473	2,900	392	1,201,900	58,490
SHELLFISH, ETC.								
Octopus	11,600	673					400	23
Grand total	3,734,500	115,428	187,800	16,473	2,900	392	1,202,300	58,513

Species	Traps		Rakes and tongs		Shovels		Abalone outfits	
SHELLFISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Crabs	400	$36						
Shrimp	1,900	405					315,100	$58,161
Abalone					5,100	$1,240		
Clams, Pismo								
Mussels			100	$8				
Octopus	36,400	2,112						
Oysters, market, Japanese			1,200	278				
Total	38,700	2,553	1,300	286	5,100	1,240	315,100	58,161

NOTE.—The catches by paranzella nets and fyke nets were made by fishermen from the San Francisco district.

Fisheries of the San Pedro district of California, 1936

OPERATING UNITS: By GEAR

Item	Purse seines			Lampara and ring nets			Gill nets		
	Mackerel	Sardine	Tuna	Mackerel	Sardine	Other	Drift, barracuda	Set, sea bass	Other
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	96	799	618	635	609	13	3		2
On boats and shore				36	18	25	24	33	38
Total	96	799	618	671	627	38	27	33	40
Vessels, motor	9	74	57	55	53	1	1		1
Net tonnage	248	3,408	2,810	1,478	1,343	31	5		6
Boats:									
Motor				4	2	4	11	16	15
Other						1			6
Accessory boats	9	74	57	59	55	4			
Apparatus:									
Number	9	74	57	59	55	6	12	16	23
Length, yards	3,924	27,582	33,513	27,909	25,895	2,164			
Square yards							104,960	53,104	22,350

Item	Trammel nets	Lines		Paranzella nets	Traps, sea crawfish	Harpoons, swordfish	Shovels	Abalone outfits	Total, exclusive of duplication
		Set and hand	Troll						
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	12	712	14	6	7	42		5	1,849
On boats and shore	57	521	415	12	201	107	83	12	904
Total	69	1,233	429	18	208	149	83	17	2,753
Vessels, motor	4	97	6	2	4	8		1	199
Net tonnage	43	4,006	42	26	32	193		9	8,220
Boats:									
Motor	22	315	320	4	127	49		3	475
Other		11			23		8	1	40
Accessory boats		96							183
Apparatus:									
Number	26	2,334	1,861	3	5,740	57	83	5	
Square yards	153,501								
Yards at mouth				50					
Hooks		279,797	1,903						

CATCH OFF CALIFORNIA: By GEAR

Species	Purse seines		Lampara and ring nets		Gill nets	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Anchovies			29,700	$431	200	$4
Barracuda	434,800	$18,425	697,500	29,557	45,000	1,907
Flounders:						
"California halibut"	400	33	1,400	115	400	33
"Sole"			500	15		
Other			100	8		
Flyingfish			17,600	645	38,000	1,395
Grayfish	1,900	61	11,700	374	22,300	714
Herring					200	8
Horse mackerel	1,097,800	6,587	3,395,300	28,483	13,500	270
Kingfish			355,600	6,493	18,400	336
Mackerel	6,803,000	61,227	70,555,100	634,996	4,100	82
Mullet					6,700	535
Perch			36,100	2,333	12,000	775
Pilchard or sardine	123,193,600	511,204	129,732,800	538,339	10,600	61
Pompano			6,800	3,207	300	141
Rock bass	1,200	73	8,000	486	3,900	237
Rockfishes			1,700	62	100	4
Rudderfishes			25,300	1,323	18,500	968
Sculpin			4,500	369		
Sea bass:						
Black	1,800	93	100	5	300	15
White	102,500	7,067	273,500	18,855	96,100	6,625

Fisheries of the San Pedro district of California, 1936—Continued

CATCH OFF CALIFORNIA: BY GEAR—continued

Species	Purse seines		Lampara and ring nets		Gill nets	
FISH—continued	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Sheepshead			500	$18	200	$7
Skates			200	3		
Smelt			225,000	8,230	71,700	2,623
Swordfish	1,800	$210	600	70		
Tuna and tunalike fishes:						
Albacore	26,400	2,455	7,000	651		
Bluefin	9,251,900	453,091	4,364,900	213,760		
Bonito	148,600	4,354	479,400	14,045	1,100	32
Skipjack or striped tuna	369,400	16,480	45,000	2,008		
Yellowfin	145,900	7,855	159,800	8,604	100	5
Whitefish			800	46		
Yellowtail	33,800	1,445	56,000	2,393	1,000	43
Other fish			500	18	2,900	103
Total	141,614,800	1,090,660	210,493,000	1,515,942	367,600	16,923
SHELLFISH, ETC.						
Squid			9,000	298	500	17
Turtles			500	24		
Other shellfish			300	5		
Total			9,800	327	500	17
Grand total	141,614,800	1,090,660	210,502,800	1,516,269	368,100	16,940

Species	Trammel nets		Lines				Paranzella nets	
			Set and hand		Troll			
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Barracuda			434,000	$18,392	414,600	$17,569		
Flounders:								
"California halibut"	377,100	$30,919	44,000	3,608			207,800	$17,038
"Sole"	1,300	38	5,300	155			374,200	10,971
Other			8,500	1,410				
Grayfish	53,800	1,722	144,700	4,630	800	25	2,900	93
Hake			4,100	81				
Kingfish			53,700	980				
"Lingcod"	100	4	200	8				
Mackerel			6,975,900	78,130				
Marlin			12,300	353				
Perch			3,800	246				
Rock bass	1,700	103	138,100	8,394	300	18		
Rockfishes	500	18	666,800	24,289			1,300	47
Rudderfishes			100	5				
Sablefish			172,700	6,646				
Salmon					1,000	96		
Sculpin	200	16	99,700	8,175			1,900	156
Sea bass:								
Black	1,600	83	10,100	522			100	5
White	1,300	90	10,600	731	200	14		
Sheepshead	2,600	91	31,600	1,107				
Skates	9,200	137	5,800	87			13,600	204
Smelt			2,500	91				
Tuna, and tunalike fishes:								
Albacore			197,800	18,398	680,600	63,307		
Bluefin			12,500	612	1,400	69		
Bonito	200	6	165,200	4,840	485,900	14,236		
Skipjack or striped tuna			4,710,000	210,123	9,900	442		
Yellowfin			317,900	17,115	16,600	894		
Whitefish	100	6	13,200	762				
Yellowtail	100	4	58,700	2,509	34,500	1,474		
Other fish	200	7	2,800	99				
Total	450,000	33,244	14,302,600	412,498	1,645,800	98,144	601,800	28,514
SHELLFISH, ETC.								
Sea crawfish or spiny lobster	8,700	1,444						
Octopus			300	40				
Total	8,700	1,444	300	40				
Grand total	458,700	34,688	14,302,900	412,538	1,645,800	98,144	601,800	28,514

Fisheries of the San Pedro district of California, 1936—Continued

CATCH OFF CALIFORNIA: By gear—Continued

Species	Traps		Harpoons		Shovels		Abalone outfits	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Kingfish	200	$4						
Marlin			2,400	$72				
Perch	1,100	71						
Rock bass	53,800	3,270						
Rockfishes	1,300	47						
Sheepshead	74,300	2,604						
Swordfish			459,400	53,629				
Whitefish	2,400	138						
Other fish	600	21						
Total	133,700	6,155	461,800	53,701				
SHELLFISH								
Crabs	16,200	484						
Sea crawfish or spiny lobster	325,400	54,017						
Abalone							338,600	$33,877
Clams:								
Hard					5,100	$1,248		
Pismo					47,300	9,482		
Octopus	300	41						
Total	341,900	54,542			52,400	10,730	338,600	33,877
Grand total	475,600	60,697	461,800	53,701	52,400	10,730	338,600	33,877

CATCH OFF LATIN AMERICA: By gear

Species	Purse seines		Gill nets		Trammel nets	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Barracuda	222,300	$18,426				
Cabrilla	2,100	81				
Flounders:						
"California halibut"					181,500	$14,745
"Sole"					100	8
Grayfish					5,100	217
Groupers	1,000	58				
Rock bass					100	7
Sea bass:						
Black	2,200	133			1,500	91
White	6,800	744	6,200	$678	200	22
Sheepshead					1,100	37
Skates					1,700	45
Tuna and tunalike fishes:						
Bluefin	4,020,000	192,723				
Bonito	3,560,700	112,637	100	3		
Skipjack or striped tuna	1,646,100	70,628				
Yellowfin	3,856,000	205,084				
Whitefish					600	35
Yellowtail	1,528,700	48,702				
Total	14,845,900	649,216	6,300	681	191,900	15,207

Fisheries of the San Pedro district of California, 1936—Continued

CATCH OFF LATIN AMERICA: By gear—Continued

Species	Lines, set and hand		Traps		Harpoons	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Barracuda	83,000	$6,879				
Cabrilla	70,700	2,715				
Flounders, "California halibut"	1,400	114				
Grayfish	3,100	132				
Groupers	19,700	1,142				
"Lingcod"	300	19				
Rock bass	9,600	597				
Rockfishes	11,400	544				
Sablefish	13,900	812				
Sea bass:						
Black	277,500	16,744				
White	5,200	569				
Sheepshead	900	30				
Spanish mackerel	16,100	952				
Swordfish					1,700	$177
Tuna and tunalike fishes:						
Bluefin	1,300	62				
Bonito	43,900	1,389				
Skipjack or striped tuna	2,653,300	113,843				
Yellowfin	15,804,700	840,585				
Whitefish	5,100	282				
Yellowtail	435,000	13,858				
Other fish	100	4				
Total	19,456,200	1,001,272			1,700	177
SHELLFISH						
Sea crawfish or spiny lobster			35,100	$6,450		
Grand total	19,456,200	1,001,272	35,100	6,450	1,700	177

Fisheries of the San Diego district of California, 1936

OPERATING UNITS: By gear

Item	Ring nets		Gill nets			Trammel nets
	Mackerel	Sardine	Drift, barracuda	Set, sea bass	Other	
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	123	144	4	9		9
On boats	28	45	25	32	5	29
Total	151	189	29	41	5	38
Vessels, motor	12	14	1	2		2
Net tonnage	83	106	5	17		17
Boats:						
Motor	3	5	8	10	3	9
Other					1	
Accessory boats	15	19				
Apparatus:						
Number	15	19	9	12	5	11
Length, yards	4,770	6,056				
Square yards			54,868	64,148	4,500	105,991

Fisheries of the San Diego district of California, 1936—Continued

OPERATING UNITS: By gear—Continued

Item	Lines		Traps, sea crawfish	Harpoons, swordfish	Total, exclusive of duplication
	Set and hand	Troll			
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	758	7	7	15	793
On boats	184	109	36	30	274
Total	942	116	43	45	1,067
Vessels, motor	81	2	1	4	84
Net tonnage	4,856	14	41	37	4,877
Boats:					
Motor	71	75	27	11	119
Other	----------	----------	3	----------	4
Accessory boats	80	----------	----------	----------	85
Apparatus:					
Number	1,057	503	930	15	----------
Hooks	26,826	503	----------	----------	----------

CATCH OFF CALIFORNIA: By gear

Species	Purse seines		Ring nets		Gill nets		Trammel nets	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Barracuda	----------	----------	69,200	$2,550	47,000	$1,732	----------	----------
Carp	----------	----------	----------	----------	100	5	----------	----------
Flounders, "California halibut"	----------	----------	----------	----------	----------	----------	94,800	$6,820
Grayfish	----------	----------	----------	----------	28,600	263	12,000	110
Herring	----------	----------	----------	----------	1,500	18	----------	----------
Horse mackerel	----------	----------	60,800	363	----------	----------	----------	----------
Kingfish	----------	----------	200	5	----------	----------	----------	----------
Mackerel	20,600	$165	8,446,100	67,569	9,100	173	----------	----------
Mullet	----------	----------	----------	----------	3,900	252	----------	----------
Perch	----------	----------	----------	----------	300	14	----------	----------
Pilchard or sardine	2,310,300	9,394	13,545,000	55,069	----------	----------	----------	----------
Pompano	----------	----------	100	21	----------	----------	----------	----------
Rock bass	----------	----------	100	4	1,000	42	----------	----------
Rockfishes	----------	----------	----------	----------	200	9	----------	----------
Sea bass:								
Black	----------	----------	600	30	1,100	54	----------	----------
White	8,800	747	2,500	212	51,700	4,389	500	43
Skates	----------	----------	1,800	21	200	2	6,600	75
Smelt	----------	----------	500	17	7,100	198	----------	----------
Tuna and tunalike fishes:								
Bluefin	46,500	2,261	108,200	5,260	----------	----------	----------	----------
Bonito	----------	----------	188,000	5,444	39,700	1,150	400	12
Yellowtail	----------	----------	4,200	178	1,400	59	----------	----------
Total	2,386,200	12,567	22,427,300	136,743	192,900	8,360	114,300	7,060
SHELLFISH								
Sea crawfish or spiny lobster	----------	----------	----------	----------	----------	----------	200	30
Grand total	2,386,200	12,567	22,427,300	136,743	192,900	8,360	114,500	7,090

Fisheries of the San Diego district of California, 1936—Continued

CATCH OFF CALIFORNIA: BY GEAR—Continued

Species	Lines				Traps		Harpoons	
	Set and hand		Troll					
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Barracuda	33,500	$1,234	72,200	$2,661				
Flounders:								
"California halibut"	500	35						
"Sole"	100	4						
Grayfish	4,700	47	600	6				
Kingfish	1,100	29						
"Lingcod"	2,000	46						
Mackerel	550,300	10,588	500	10				
Marlin			400	20			1,200	$58
Rock bass	56,800	2,409	1,500	63	58,000	$2,457		
Rockfishes	153,400	6,956			100	4		
Sablefish	1,600	24						
Sculpin	3,400	504			300	5		
Sea bass:								
Black	4,100	202						
White	5,700	484	200	17				
Sheepshead	3,200	125			3,600	140		
Skates	400	4			100	1		
Swordfish							90,200	7,964
Tuna and tunalike fishes:								
Albacore	1,000	93	1,400	130				
Bluefin	22,200	1,079	1,000	49				
Bonito	205,900	5,962	501,800	14,530				
Skipjack or striped tuna	3,320,900	149,422	1,500	68				
Yellowfin	108,100	5,987	18,900	1,047				
Whitefish	10,300	536						
Yellowtail	43,500	1,838	20,600	871				
Other fish	200	5						
Total	4,532,900	187,613	620,600	19,472	62,100	2,607	91,400	8,022
SHELLFISH								
Sea crawfish or spiny lobster					79,900	12,662		
Grand total	4,532,900	187,613	620,600	19,472	142,000	15,269	91,400	8,022

CATCH OFF LATIN AMERICA: BY GEAR

Species	Purse seines		Ring nets		Gill nets		Trammel nets	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Barracuda			38,100	$1,922	27,700	$1,397	622,000	$40,604
Flounders, "California halibut"					2,200	37	1,400	23
Grayfish								
Horse mackerel			1,200	7				
Mackerel			1,225,700	11,229	7,700	154		
Perch			100	4				
Pilchard or sardine			700	12				
Pompano			400	51				
Rock bass			400	16	300	12		
Sea bass:								
Black			5,000	226	3,800	171	2,400	108
White			4,600	387	142,900	12,010	300	25
Sheepshead			1,500	53	500	18		
Skates							2,000	18
Smelt			1,200	73	600	36		
Tuna and tunalike fishes:								
Bluefin	106,300	$5,181	524,200	25,547				
Bonito	1,300	40	332,500	10,204	9,100	279	1,000	31
Skipjack or striped tuna	207,700	9,164						
Yellowfin	840,300	44,275						
Yellowtail			196,900	5,630	5,500	157		
Other fish							100	3
Total	1,155,600	58,660	2,332,500	55,361	200,300	14,271	629,200	40,812
SHELLFISH								
Sea crawfish or spiny lobster							700	58
Grand total	1,155,600	58,660	2,332,500	55,361	200,300	14,271	629,900	40,870

Fisheries of the San Diego district of California, 1936—Continued

CATCH OFF LATIN AMERICA: BY GEAR—Continued

Species	Lines				Traps		Harpoons	
	Set and hand		Troll					
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Barracuda	308,500	$15,559	50,400	$2,542				
Cabrilla	124,100	3,879						
Flounders, "California halibut"	1,400	91						
Grayfish	2,500	43						
Groupers	39,800	1,374						
Kingfish	100	5						
"Lingcod"	3,600	136						
Mackerel	480,700	4,404						
Marlin	300	12						
Rock bass	81,400	3,328						
Rockfishes	98,100	4,770						
Sablefish	500	20						
Sculpin	700	50						
Sea bass:								
Black	85,400	3,853						
White	76,300	6,413	400	34				
Sheepshead	8,600	303						
Smelt	200	12						
Spanish mackerel	1,900	56						
Swordfish							23,700	$2,143
Tuna and tunalike fishes:								
Bluefin	464,400	22,633	100	5				
Bonito	962,900	29,551	87,700	2,691				
Skipjack or striped tuna	14,027,800	618,930	600	26				
Yellowfin	57,082,900	3,007,681	1,500	79				
Whitefish	14,000	718						
Yellowtail	7,585,800	216,909	86,800	2,482				
Other fish	700	18						
Total	81,452,600	3,940,748	227,500	7,859			23,700	2,143
SHELLFISH, ETC.								
Sea crawfish or spiny lobster					885,000	$73,765		
Turtles							2,200	97
Total					885,000	73,765	2,200	97
Grand total	81,452,600	3,940,748	227,500	7,859	885,000	73,765	25,900	2,240

HALIBUT FISHERY OF THE PACIFIC COAST[10]

The halibut fishery of the Pacific coast, which is prosecuted by United States (including Alaska) and Canadian vessels, ranks as one of the foremost fisheries of that section. During 1936 the total catch of halibut by vessels of both nationalities amounted to 48,054,000 pounds, valued at $3,603,000. This is an increase of 5 percent in volume and 11 percent in value as compared with the catch and its value in 1935. Of the total catch in 1936, 78 percent was taken by United States craft and 22 percent by Canadian craft. Considered according to ports of landing, 47 percent was landed at Seattle, Wash.; 35 percent at Canadian ports; and 18 percent at ports in Alaska.

[10] These statistics are compiled from data collected by the International Fisheries Commission for Washington and British Columbia, and by Bureau agents for Alaska. The weights of the above species represent the fish after evisceration and removal of heads.

Halibut fishery of the Pacific coast, 1936

UNITED STATES OPERATING UNITS: BY FLEET CLASSIFICATION

Item	Washington fleet	Alaska fleet	Total
Regular halibut vessels:			
Number	130	104	234
Net tonnage	3,878	1,412	5,290
Crew	1,001	460	1,461
Skates of lines	4,094	1,994	6,088
Vessels in other fisheries but landing one or more fares of halibut:			
Number	18	31	49
Net tonnage	380	286	666
Crew	100	99	199
Skates of lines	444	402	846
Regular halibut boats:			
Number		26	26
Crew		65	65
Skates of lines		364	364
Boats in other fisheries but landing one or more fares of halibut:			
Number	1	52	53
Crew	2	93	95
Skates of lines	6	286	292

CATCH OF ALL SPECIES: BY UNITED STATES VESSELS AND BOATS [1]

Fleet classification	Landed in—						Total	
	Seattle, Wash.		British Columbia		Alaska			
WASHINGTON FLEET								
Regular vessels:	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Halibut	20,913,875	$1,837,646	1,789,364	$134,968	604,195	$38,401	23,307,434	$2,011,015
Sablefish	2,274,169	95,502	5,018	287	48,396	1,149	2,327,583	96,938
"Lingcod"	683,280	22,849					683,280	22,849
Rockfishes	395,235	13,200	1,482	30	78	2	396,795	13,232
Total	24,266,559	1,969,197	1,795,864	135,285	652,669	39,552	26,715,092	2,144,034
Other vessels and boats:								
Halibut	525,077	42,609	28,848	2,402	35,200	1,960	589,125	46,971
Sablefish	57,167	2,177					57,167	2,177
"Lingcod"	78,104	1,770					78,104	1,770
Rockfishes	12,113	306					12,113	306
Total	672,461	46,862	28,848	2,402	35,200	1,960	736,509	51,224
ALASKA FLEET								
Regular vessels:								
Halibut	1,154,327	96,797	4,230,865	313,507	5,563,044	328,081	10,948,236	738,385
Sablefish	7,074	358	221,728	6,621	726,462	16,272	955,264	23,251
"Lingcod"	71,120	2,800			28,777	577	99,897	3,377
Rockfishes	31,919	1,239			17,986	436	49,905	1,675
Total	1,264,440	101,194	4,452,593	320,128	6,336,269	345,366	12,053,302	766,688
Other vessels and boats:								
Halibut			165,769	12,267	2,452,335	138,802	2,618,104	151,069
Sablefish					24,125	579	24,125	579
"Lingcod"					594	10	594	10
Rockfishes					1,737	28	1,737	28
Total			165,769	12,267	2,478,791	139,419	2,644,560	151,686
COMBINED FLEETS								
Regular vessels:								
Halibut	22,068,202	1,934,443	6,020,229	448,475	6,167,239	366,482	34,255,670	2,749,400
Sablefish	2,281,243	95,860	226,746	6,908	774,858	17,421	3,282,847	120,189
"Lingcod"	754,400	25,649			28,777	577	783,177	26,226
Rockfishes	427,154	14,439	1,482	30	18,064	438	446,700	14,907
Total	25,530,999	2,070,391	6,248,457	455,413	6,988,938	384,918	38,768,394	2,910,722
Other vessels and boats:								
Halibut	525,077	42,609	194,617	14,669	2,487,535	140,762	3,207,229	198,040
Sablefish	57,167	2,177			24,125	579	81,292	2,756

[1] Does not include 856,069 pounds of halibut valued at $84,521 landed at Seattle, and 5,500 pounds valued at $427 landed in British Columbia after Jan. 1, 1936, which were part of the 1935 quota.

Halibut fishery of the Pacific coast, 1936—Continued

CATCH OF ALL SPECIES: BY UNITED STATES VESSELS AND BOATS—Continued

Fleet classification	Landed in—						Total	
	Seattle, Washington		British Columbia		Alaska			
COMBINED FLEETS—con.								
Other vessels and boats—Continued.	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
"Lingcod"	78,104	$1,770			594	$10	78,698	$1,780
Rockfishes	12,113	306			1,737	28	13,850	334
Total	672,461	46,862	194,617	$14,669	2,513,991	141,379	3,381,069	202,910
All vessels and boats:								
Halibut	22,593,279	1,977,052	6,214,846	463,144	8,654,774	507,244	37,462,899	2,947,440
Sablefish	2,338,410	98,037	226,746	6,908	798,983	18,000	3,364,139	122,945
"Lingcod"	832,504	27,419			29,371	587	861,875	28,006
Rockfishes	439,267	14,745	1,482	30	19,801	466	460,550	15,241
Grand total	26,203,460	2,117,253	6,443,074	470,082	9,502,929	526,297	42,149,463	3,113,632

CATCH OF HALIBUT: BY UNITED STATES AND CANADIAN VESSELS AND BOATS

[Expressed in thousands of pounds and thousands of dollars; that is, 000 omitted]

Fleet classification	Landed in—						Total	
	Seattle, Washington		British Columbia		Alaska			
WASHINGTON FLEET	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Regular halibut vessels	20,914	$1,838	1,790	$135	604	$38	23,308	$2,011
Other vessels and boats	525	43	29	2	35	2	589	47
Total	21,439	1,881	1,819	137	639	40	23,897	2,058
ALASKA FLEET								
Regular halibut vessels	1,154	97	4,231	313	5,563	328	10,948	738
Other vessels and boats			166	12	2,452	139	2,618	151
Total	1,154	97	4,397	325	8,015	467	13,566	889
COMBINED FLEETS								
Regular halibut vessels	22,068	1,935	6,021	448	6,167	366	34,256	2,749
Other vessels and boats	525	43	195	14	2,487	141	3,207	198
Total	22,593	1,978	6,216	462	8,654	507	37,463	2,947
British Columbia fleet			10,587	656	4	(1)	10,591	656
Grand total	22,593	1,978	16,803	1,118	8,658	507	48,054	3,603

[1] Less than $500.

NOTE.—In addition to the above it is estimated that about 1,212,000 pounds of halibut, sablefish, "lingcod," and rockfish livers, valued at approximately $545,000 were landed by the combined fleets at Pacific coast ports during 1936.

The tabulation does not include landings at ports south of Seattle, Wash., which are normally less than 4 percent of the annual Pacific coast catch.

VESSEL FISHERIES AT SEATTLE, WASH.

A total of 49,831,417 pounds of fishery products, valued at $3,254,514, were handled by Seattle wholesale dealers during 1936, exclusive of quantities received by transporting vessels or by rail from Alaska or Canada. This represents an increase of 3 percent in volume and 8 percent in value as compared with the volume and value of the products handled during the preceding year. Of the total quantity 27,059,529 pounds, valued at $2,201,774, were landed by fishing vessels—an increase of 8 percent in volume and 18 percent in value as compared with the previous year. Receipts by wholesale dealers from sources other than Alaska or Canada or from vessels in the halibut fleet, amounted to 22,771,888 pounds, valued at $1,052,740, which is a decrease of 2 percent in volume and 8 percent in value.

Fishery products landed by United States vessels at Seattle, Wash., 1936 [1]

BY FISHING GROUNDS

Fishing grounds	Trips	Halibut				Sablefish		"Lingcod"		Rockfishes		Total	
		No. 1		No. 2									
	Number	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
West of Cape Spencer	571	10,833,010	$993,540	7,447,535	$638,416	98,910	$3,665	5,003	$161	45,537	$1,457	18,429,995	$1,637,239
South of Cape Spencer	722	2,768,816	242,499	2,399,987	187,118	2,239,500	94,372	827,501	27,258	393,730	13,288	8,629,534	564,535
Total	1,293	13,601,826	1,236,039	9,847,522	825,534	2,338,410	98,037	832,504	27,419	439,267	14,745	27,059,529	2,201,774

BY MONTHS

Months	Trips	Halibut				Sablefish		"Lingcod"		Rockfishes		Total	
		No. 1		No. 2									
	Number	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
January [2]	46	404,113	$41,839	451,956	$42,682	14,113	$540	35,966	$1,908	20,286	$987	926,434	$87,956
February	16							121,741	5,228	33,656	1,385	155,397	6,613
March	64	695,413	62,035	243,071	17,884	6,811	291	102,403	4,169	31,617	1,386	1,079,315	85,765
April	196	2,420,219	179,044	1,239,491	88,516	28,920	1,013	150,175	3,642	54,909	1,309	3,893,714	273,524
May	155	1,758,528	133,634	1,153,207	81,367	16,932	646	114,592	2,324	52,011	1,076	3,095,270	219,047
June	177	1,855,184	158,005	1,672,769	129,745	153,906	5,537	77,714	1,650	55,931	1,149	3,815,504	296,086
July	133	1,440,477	134,528	1,374,498	109,837	81,818	2,901	30,083	831	19,545	568	2,946,421	248,665
August	136	1,520,841	146,117	1,208,834	103,885	260,102	9,526	17,872	567	40,073	1,218	3,047,722	261,313
September	120	1,283,420	142,358	953,367	97,318	487,973	19,106	14,120	570	29,696	1,442	2,768,576	260,594
October	119	1,215,136	133,968	761,941	76,929	658,374	29,308	32,757	1,437	29,221	1,295	2,697,429	242,937
November	111	1,008,495	104,511	788,388	77,371	585,630	27,022	49,374	1,875	24,113	989	2,456,000	211,768
December	20					43,831	2,147	85,707	3,218	48,209	2,141	177,747	7,506
Total	1,293	13,601,826	1,236,039	9,847,522	825,534	2,338,410	98,037	832,504	27,419	439,267	14,745	27,059,529	2,201,774

[1] Halibut fleet.
[2] The halibut landed during January were caught prior to the close of the halibut season on Dec. 26, 1935, and were a part of the 1935 quota.

NOTE.—The statistics in this table are compiled from reports collected by the Bureau of Fisheries and the International Fisheries Commission.

Fishery products received by Seattle wholesale dealers, 1936; by months [1]

Species	January		February		March		April		May		June	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod	32,986	$852	17,606	$495	62,668	$1,504	31,999	$496	1,200	$18	135	$2
Flounders:												
"Sole"	116,414	3,458	84,912	2,666	81,711	2,958	426,876	7,598	561,484	8,423	563,407	8,451
Other	129,492	2,575	57,020	1,477	7,634	192	980	14			350	5
Halibut					131	13	4,821	260	32,532	1,695	52,291	2,677
Herring	990	15	7,750	157	131,300	788						
"Lingcod"	13,233	582	33,183	1,092	84,775	3,476	65,094	1,110	66,361	1,165	79,602	796
Perch	6,090	184	3,619	132	8,650	346	11,195	336	1,733	52	576	23
Rockfishes	13,779	495	4,105	169	5,278	185	3,190	64	280	5	6,401	77
Sablefish											331	10
Salmon:												
Blueback, red, or sockeye											183	9
Chinook or king			12,045	1,470	15,096	2,249	476,793	48,776	321,585	25,341	966,245	67,444
Silver or coho							382	28	2,009	127	158,424	7,604
Smelt	53,844	2,525	46,631	1,191	21,307	507	5,680	448	4,594	366	10,747	634
Crabs	73,344	6,073	95,732	7,869	54,456	4,307	99,446	7,110	79,631	5,972	83,374	5,753
Octopus	2,462	97	1,616	66	3,078	134	3,952	178	3,655	110	2,364	95
Squid	3,046	158	30	1								
Total	445,680	17,014	364,249	16,785	476,084	16,659	1,130,408	66,418	1,075,064	43,274	1,924,430	93,580

Species	July		August		September		October		November		December		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Cod	755	$13	2,267	$36	7,761	$116	9,108	$200	41,714	$763	57,446	$1,062	265,645	$5,557
Flounders:														
"Sole"	532,028	8,299	568,804	9,613	231,139	4,794	290,556	7,758	159,086	4,629	175,995	4,893	3,792,412	73,540
Other	42	1	1,562	23	605	8	2,627	46	7,153	129	28,123	753	235,588	5,223
Halibut	60,942	3,139	13,245	760	199	15	315	30					164,476	8,589
Herring							275	5	1,160	23	13,400	252	154,875	1,240
"Lingcod"	77,949	779	119,408	1,602	47,560	875	76,908	1,446	50,653	1,130	26,597	678	741,323	14,731
Perch	1,623	57	3,608	108	4,784	153	6,389	224	7,528	210	13,185	339	68,980	2,164
Rockfishes	3,407	95	8,294	149	15,021	230	14,805	281	16,222	454	16,765	612	107,547	2,816
Sablefish	135,116	1,946	57,433	896					141	4			193,021	2,856
Salmon:														
Blueback, red, or sockeye	64	5	12,107	1,211			102	9					12,456	1,234
Chinook or king	1,917,368	133,065	2,561,915	187,276	594,312	38,018	324,225	19,551	112,457	5,747	5,758	213	7,307,799	529,150
Chum or keta	228	8	232	4	20,423	491	2,943,681	71,237	561,045	12,175	795	16	3,526,404	83,931
Humpback or pink	2,544	51	1,064	26									3,608	77
Silver or coho	782,423	38,886	1,384,942	61,630	533,857	27,921	1,288,366	63,945	337,959	14,938	105,702	5,116	4,594,064	220,195
Smelt	19,187	768	54,793	2,181	95,540	3,631	94,599	3,670	53,672	2,641	60,884	3,299	521,478	21,861
Crabs	58,784	5,232	30,767	2,787	7,546	772	100,664	6,563	133,774	9,230	197,302	14,916	[2] 1,014,820	76,584
Octopus	4,568	183	3,189	144	7,041	317	5,638	226	6,571	261	5,956	237	50,090	2,048
Squid									1,755	94	12,471	691	17,302	944
Total	3,597,028	192,527	4,823,630	268,446	1,565,788	77,341	5,158,258	175,191	1,490,890	52,428	720,379	33,077	22,771,888	1,052,740

[1] This tabulation does not include fish received from Alaska or Canada, or vessels in the halibut fleet.

[2] 47,659 dozen.

LAKE FISHERIES [11]

In 1936 the yield of the fisheries of the Great Lakes, including those of the international lakes of northern Minnesota, in the United States and Canada amounted to 124,408,100 pounds, representing an increase of 2 percent as compared with the catch in the preceding year.

Considering the fishery of United States craft only, the catch amounted to 94,276,500 pounds, valued at $6,389,443, which is an increase of 4 percent in volume and 7 percent in value as compared with the catch in the previous year. These fisheries gave employment to 5,623 fishermen or 26 percent less than in 1934, the most recent previous year for which statistics on employment are available. During the survey for 1936 data, statistics of the catch in 1935 also were collected. These are presented following the data for 1936.

Lake fisheries of the United States and Canada, 1936

CATCH: BY LAKES

Species	Lake Ontario			Lake Erie		
	United States	Canada	Total	United States	Canada	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Blue pike	27,900	13,700	41,600	19,908,600	6,878,900	26,787,500
Bowfin	200	(1)	200	600	(1)	600
Burbot	6,900	(1)	6,900	454,500	(1)	454,500
Carp	12,900	174,900	187,800	2,687,000	360,500	3,047,500
Catfish and bullheads	80,800	191,600	272,400	573,900	70,900	644,800
Cisco				68,000	78,800	146,800
Eels	44,200	53,800	98,000			
Goldfish				336,000	(1)	336,000
Lake herring	223,100	1,332,500	1,555,600			
Lake trout	8,200	226,500	234,700	1,600	200	1,800
Mooneye				8,800	(1)	8,800
Pike or pickerel (jacks)	10,200	100,600	110,800	1,200	1,600	2,800
Rock bass	4,100	(1)	4,100	3,200	(1)	3,200
Sauger				1,737,500	(1)	1,737,500
Sheepshead				3,500,700	(1)	3,500,700
Sturgeon	12,800	6,400	19,200	11,600	12,500	24,100
Sucker "mullet"	38,000	(1)	38,000	946,100	(1)	946,100
Sunfish	14,900	(1)	14,900			
White bass				663,900	(1)	663,900
Whitefish:						
Common	53,100	576,200	629,300	1,158,400	1,767,700	2,926,100
Menominee	100	(1)	100			
Yellow perch	54,600	164,800	219,400	2,050,500	1,254,100	3,304,600
Yellow pike	9,100	26,300	35,400	2,636,900	326,100	2,963,000
Mussel shells				28,000	(1)	28,000
Miscellaneous		287,200	287,200		1,201,600	1,201,600
Total	601,100	3,154,500	3,755,600	36,777,000	11,952,900	48,729,900

[1] Where there has been a Canadian catch of these species it is included under "Miscellaneous."

[11] The statistics of the catch presented herewith were obtained principally from records of the various State fishery agencies. The data for the operating units (fishermen, vessels, boats, and gear) of the United States were obtained largely by Bureau agents in a special canvass; although State records in several instances were very helpful in this work. In all cases the statistics collected are for the calendar year, except for Lake of the Woods, Rainy Lake, and Lake Namakan in Minnesota, which are for two seasons. For Lake of the Woods, the seasons are from June 1 to November 1 and December 1 to April 1 and for Rainy and Namakan Lakes from May 15 to November 1 and December 1 to April 1. The catches for these two seasons, in the order named, have been combined to constitute a year. The quantity of fish taken in these lakes between January 1 and April 1 is estimated at less than 3 percent of the total catch.

Lake fisheries of the United States and Canada, 1936—Continued

CATCH: BY LAKES—Continued

Species	Lake Huron			Lake Michigan	Lake Superior		
	United States	Canada	Total	United States	United States	Canada	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Bowfin	100	(1)	100				
Burbot	1,300	(1)	1,300	33,400	1,700	(1)	1,700
Carp	770,000	28,900	798,900	1,486,300	1,800	(1)	1,800
Catfish and bullheads	122,000	13,100	135,100	87,200			
Chubs	335,100	568,900	904,000	5,674,100	356,000	104,800	460,800
Lake herring	3,982,200	198,100	4,180,300	4,796,000	11,756,600	2,683,700	14,440,300
Lake trout	1,399,900	4,314,800	5,714,700	4,762,600	3,233,200	1,596,200	4,829,400
Pike or pickerel (jacks)	23,400	105,000	128,400	16,000	24,600	5,900	30,500
Rock bass	12,200	(1)	12,200	2,200			
Sauger	38,700	(1)	38,700	3,400	1,300	(1)	1,300
Sheepshead	8,300	(1)	8,300	11,000			
Smelt				1,202,000			
Steelhead trout				2,000			
Sturgeon		16,200	16,200			500	500
Sucker "mullet"	1,813,700	(1)	1,813,700	2,685,900	190,700	(1)	190,700
White bass	100	(1)	100				
Whitefish:							
Common	1,442,200	1,479,300	2,921,500	1,025,500	374,100	319,500	693,600
Menominee	44,600	(1)	44,600	66,800	55,700	(1)	55,700
Yellow perch	1,175,300	124,800	1,300,100	2,507,800	7,800	(1)	7,800
Yellow pike	1,565,200	430,300	1,995,500	116,100	4,700	84,000	88,700
Crawfish				41,500			
Mussel shells	55,800	(1)	55,800	1,263,300			
Miscellaneous		510,000	510,000			104,900	104,900
Total	12,790,100	7,789,400	20,579,500	25,783,100	16,008,200	4,899,500	20,907,700

Species	Namakan Lake			Rainy Lake		
	United States	Canada	Total	United States	Canada	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Chubs					45,700	45,700
Pike or pickerel (jacks)	5,100	4,000	9,100	43,200	171,900	215,100
Sturgeon		2,400	2,400	600	800	1,400
Sucker "mullet"				300	(1)	300
Whitefish, common	21,100	19,800	40,900	50,200	86,900	137,100
Yellow perch	100		100	4,600	(1)	4,600
Yellow pike	11,700	14,600	26,300	41,800	151,400	193,200
Miscellaneous					54,600	54,600
Total	38,000	40,800	78,800	140,700	511,300	652,000

Species	Lake of the Woods			Total, all lakes		
	United States	Canada	Total	United States	Canada	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Blue pike				19,936,500	6,892,600	26,829,100
Bowfin				900	(1)	900
Burbot	131,800	(1)	131,800	629,600	(1)	629,600
Carp	13,900	1,200	15,100	4,971,900	565,500	5,537,400
Catfish and bullheads	60,700	62,600	123,300	924,600	338,200	1,262,800
Chubs				6,365,200	719,400	7,084,600
Cisco				68,000	78,800	146,800
Crappie	200	(1)	200	200	(1)	200
Eels				44,200	53,800	98,000
Goldfish				336,000	(1)	336,000
Lake herring				20,757,900	4,214,300	24,972,200
Lake trout		20,700	20,700	9,405,500	6,158,400	15,563,900
Mooneye				8,800	(1)	8,800
Pike or pickerel (jacks)	197,300	456,600	653,900	321,000	845,600	1,166,600
Rock bass				21,700	(1)	21,700
Sauger	391,400	25,200	416,600	2,172,300	25,200	2,197,500
Sheepshead				3,520,000	(1)	3,520,000

[1] Where there has been a Canadian catch of these species it is included under "Miscellaneous."

Lake fisheries of the United States and Canada, 1936—Continued

CATCH: BY LAKES—Continued

Species	Lake of the Woods			Total, all lakes		
	United States	Canada	Total	United States	Canada	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Smelt				1, 202, 000	(1)	1, 202, 000
Steelhead trout				2, 000	(1)	2, 000
Sturgeon	300	(1)	300	25, 300	38, 800	64, 100
Sucker "mullet"	230, 600	2, 400	233, 000	5, 905, 300	2, 400	5, 907, 700
Sunfish				14, 900	(1)	14, 900
Tullibee	103, 100	65, 000	168, 100	103, 100	65, 000	168, 100
White bass				664, 000	(1)	664, 000
Whitefish:						
Common	6, 400	267, 100	273, 500	4, 131, 000	4, 516, 500	8, 647, 500
Menominee				167, 200	(1)	167, 200
Yellow perch	156, 000	21, 600	177, 600	5, 956, 700	1, 565, 300	7, 522, 000
Yellow pike	846, 600	771, 300	1, 617, 900	5, 232, 100	1, 804, 000	7, 036, 100
Crawfish				41, 500	(1)	41, 500
Mussel shells				1, 347, 100	(1)	1, 347, 100
Miscellaneous		89, 500	89, 500		2. 247, 800	2, 247, 800
Total	2, 138, 300	1, 783, 200	3, 921, 500	94, 276, 500	30, 131, 600	124, 408, 100

[1] Where there has been a Canadian catch of these species it is included under "Miscellaneous."

Lake fisheries of the United States, 1936

OPERATING UNITS: BY LAKES

Item	Lake Ontario	Lake Erie	Lake Huron	Lake Michigan	Lake Superior	Lake of the Woods, Rainy Lake, and Namakan Lake	Total
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	15	230	155	1, 044	145		1, 589
On boats and shore:							
Regular	51	600	593	599	796	135	2, 774
Casual	70	251	88	652	199		1, 260
Total	136	1, 081	836	2, 295	1, 140	135	5, 623
Vessels:							
Steam		15	7	29	4		55
Net tonnage		427	123	658	109		1, 317
Motor	4	33	36	300	47		420
Net tonnage	45	340	499	3, 429	437		4, 750
Total vessels	4	48	43	329	51		475
Total net tonnage	45	767	622	4. 087	546		6, 067
Boats:							
Motor	35	268	232	392	288	79	1, 294
Other	49	271	93	472	436	6	1, 327
Accessory boats			4	14			18
Apparatus:							
Haul seines	6	120	46	27	8		207
Length, yards	480	54, 653	23, 390	9, 345	1, 055		88, 923
Gill nets:							
"Shoal," 2⅛ to 3⅞ inches	1, 350	13, 437	1, 819	35, 959	10, 036		62, 601
Square yards	245, 276	1, 658, 334	470, 150	5, 549, 952	2, 177, 178		10, 100, 890
"Shoal," 4 to 7 inches	327	7, 940	4, 772	33, 279	10, 399	239	56, 956
Square yards	71, 154	1, 191, 048	1, 419, 901	7, 255, 371	2, 927, 984	75, 022	12, 940, 480
"Shoal," 10 to 14 inches	15	14					29
Square yards	5, 550	1, 750					7, 300
Trammel nets		78					78
Square yards		3, 120					3, 120
Lines:							
Troll				2	31		33
Hooks				2	217		219
Trot	37	28	237	493	1, 830		2, 625
Hooks	11, 250	7, 500	84, 900	161, 970	326, 000		591, 620
Pound nets		40	259	489	141	73	1, 002
Trap nets	144	4, 271	2, 558	395	96		7, 464
Fyke nets	81	580	85	657	14	95	1, 512
Crawfish pots				1, 040			1, 040
Crowfoot bars				257			257
Picks		4	11	113			128

Lake fisheries of the United States, 1936—Continued

OPERATING UNITS: BY STATES AND LAKES

Item	New York			Pennsylvania	Ohio
	Lake Ontario	Lake Erie	Total	Lake Erie	Lake Erie
	Number	*Number*	*Number*	*Number*	*Number*
Fishermen:					
On vessels	15	25	40	99	106
On boats and shore:					
Regular	51	10	61	42	513
Casual	70	47	117	3	134
Total	136	82	218	144	753
Vessels:					
Steam		1	1	9	5
Net tonnage		24	24	211	192
Motor	4	6	10	10	17
Net tonnage	45	39	84	102	199
Total vessels	4	7	11	19	22
Total net tonnage	45	63	108	313	391
Boats:					
Motor	35	10	45	14	223
Other	49	33	82		208
Apparatus:					
Haul seines	6	6	12		82
Length, yards	480	400	880		44, 628
Gill nets:					
"Shoal," 2½ by 3⅞ inches	1, 350	678	2, 028	7, 016	5, 743
Square yards	245, 276	168, 702	413, 978	679, 096	810, 536
"Shoal," 4 to 7 inches	327	508	835	4, 926	2, 506
Square yards	71, 154	94, 340	165, 494	752, 160	344, 548
"Shoal," 10 to 14 inches	15	14	29		
Square yards	5, 550	1, 750	7, 300		
Trammel nets					78
Square yards					3, 120
Lines, trot	37	25	62		
Hooks	11, 250	6, 500	17, 750		
Pound nets				40	
Trap nets	144	16	160	28	4, 166
Fyke nets	81		81		348

Item	Michigan					Indiana
	Lake Erie	Lake Huron	Lake Michigan	Lake Superior	Total	Lake Michigan
	Number	*Number*	*Number*	*Number*	*Number*	*Number*
Fishermen:						
On vessels		155	342	75	572	15
On boats and shore:						
Regular	35	593	250	326	1, 204	19
Casual	67	88	328	73	556	41
Total	102	836	920	474	2, 332	75
Vessels:						
Steam		7	8	4	19	2
Net tonnage		123	110	109	342	23
Motor		36	98	17	151	1
Net tonnage		499	1, 130	187	1, 816	45
Total vessels		43	106	21	170	4
Total net tonnage		622	1, 240	296	2, 158	67
Boats:						
Motor	21	232	190	179	622	43
Other	30	93	200	46	369	2
Accessory boats		4			4	
Apparatus:						
Haul seines	32	46		8	86	
Length, yards	9, 625	23, 390		1, 055	34, 070	
Gill nets:						
"Shoal," 2½ to 3⅞ inches		1, 819	9, 294	4, 224	15, 337	740
Square yards		470, 150	1, 798, 797	660, 458	2, 929, 405	177, 940
"Shoal," 4 to 7 inches		4, 772	17, 694	6, 253	28, 719	575
Square yards		1, 419, 901	3, 914, 221	1, 858, 134	7, 192, 256	183, 490
Lines:						
Troll			2	31	33	
Hooks			2	217	219	
Trot	3	237	165	958	1, 363	
Hooks	1, 000	84, 900	50, 670	272, 930	409, 500	
Pound nets		259	201	55	515	6
Trap nets	61	2, 558	388	96	3, 103	7
Fyke nets	232	85	44	5	366	
Crowfoot bars			113		113	60
Picks	4	11	113		128	

Lake fisheries of the United States, 1936—Continued

OPERATING UNITS: By States and lakes—Continued

Item	Illinois	Wisconsin			Minnesota		
	Lake Michigan	Lake Michigan	Lake Superior	Total	Lake Superior	Lake of the Woods, Rainy Lake, and Namakan Lake	Total
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels	74	613	70	683			
On boats and shore:							
Regular	3	327	118	445	352	135	487
Casual		283	26	309	100		100
Total	77	1,223	214	1,437	452	135	587
Vessels:							
Steam		20		20			
Net tonnage		526		526			
Motor	23	176	30	206			
Net tonnage	307	1,947	250	2,197			
Total vessels	23	196	30	226			
Total net tonnage	307	2,473	250	2,723			
Boats:							
Motor	1	158	54	212	55	79	134
Other	1	269	54	323	336	6	342
Accessory boats		14		14			
Apparatus:							
Haul seines		27		27			
Length, yards		9,345		9,345			
Gill nets:							
"Shoal," 2⅛ to 3⅞ inches	2,400	23,525	1,410	24,935	4,402		4,402
Square yards	359,867	3,213,348	319,420	3,532,768	1,197,300		1,197,300
"Shoal," 4 to 7 inches	1,495	13,515	2,310	15,825	1,836	239	2,075
Square yards	325,180	2,832,480	642,050	3,474,530	427,800	75,022	502,822
Lines:							
Trot		328	110	438	762		762
Hooks		111,300	22,590	133,890	30,480		30,480
Pound nets		282	86	368		73	73
Fyke nets		613	9	622		95	95
Crawfish pots		1,040		1,040			
Crowfoot bars		84		84			

OPERATING UNITS OF LAKE ONTARIO: By gear [1]

Item	Haul seines	Gill nets			Lines, trot	Trap nets	Fyke nets	Total, exclusive of duplication
		"Shoal" 2⅛ to 3⅞ inches	"Shoal" 4 to 7 inches	"Shoal" 10 to 14 inches				
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels		15	3					15
On boats and shore:								
Regular	1	34	31	4	5	20	7	51
Casual	11	13	4	3	27	16	14	70
Total	12	62	38	7	32	36	21	136
Vessels, motor		4	1					4
Net tonnage		45	12					45
Boats:								
Motor	1	21	16	2	6	13	4	35
Other	4	4		1	23	12	13	49
Apparatus:								
Number	6	1,350	327	15	37	144	81	
Length, yards	480							
Square yards		245,276	71,154	5,550				
Hooks					11,250			

[1] Includes Niagara River below the Falls and the St. Lawrence River.

Lake fisheries of the United States, 1936—Continued

OPERATING UNITS OF LAKE ERIE: BY GEAR [1]

Item	Haul seines	Gill nets			Trammel nets	Lines, trot
		"Shoal" 2¼ to 3⅞ inches	"Shoal" 4 to 7 inches	"Shoal" 10 to 14 inches		
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels		217	200			
On boats and shore:						
Regular	115	61	37		10	1
Casual	148	15		1	2	25
Total	263	293	237	1	12	26
Vessels:						
Steam		15	15			
Net tonnage		427	427			
Motor		30	25			
Net tonnage		312	262			
Total vessels		45	40			
Total net tonnage		739	689			
Boats:						
Motor	52	28	12	1	5	
Other	112	5	1		4	25
Apparatus:						
Number	120	13, 437	7, 940	14	78	28
Length, yards	54, 653					
Square yards		1, 658, 334	1, 191, 048	1, 750	3, 120	
Hooks						7, 500

Item	Pound nets	Trap nets	Fyke nets	Picks	By hand	Total, exclusive of duplication
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels		3				230
On boats and shore:						
Regular	15	453	75			600
Casual		52	29	4	13	251
Total	15	508	104	4	13	1, 081
Vessels:						
Steam						15
Net tonnage						427
Motor		1				33
Net tonnage		5				340
Total vessels		1				48
Total net tonnage		5				767
Boats:						
Motor	3	188	35			268
Other		103	41	4	13	271
Apparatus:						
Number	40	4, 271	580	4		

[1] Includes Niagara River above the Falls.

Lake fisheries of the United States, 1936—Continued

OPERATING UNITS OF LAKE HURON: BY GEAR

Item	Haul seines	Gill nets		Lines, trot	Pound nets	Trap nets	Fyke nets	Picks	By hand	Total, exclusive of duplication
		"Shoal" 2⅛ to 3⅞ inches	"Shoal" 4 to 7 inches							
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels		42	91	56	9	34				155
On boats and shore:										
Regular	55	57	86	7	152	463	11			593
Casual	49	12	13			16		11	4	88
Total	104	111	190	63	161	513	11	11	4	836
Vessels:										
Steam		1	6	2	1					7
Net tonnage		8	97	41	5					123
Motor		9	20	10	2	11				36
Net tonnage		127	300	221	13	98				499
Total vessels		10	26	12	3	11				43
Total net tonnage		135	397	262	18	98				622
Boats:										
Motor	33	29	47	4	51	155	5			232
Other	13	12	6		11	50	1	11	4	93
Accessory boats						4				4
Apparatus:										
Number	46	1,819	4,772	237	259	2,558	85	11		
Length, yards	23,390									
Square yards		470,150	1,419,901							
Hooks				84,900						

OPERATING UNITS OF LAKE MICHIGAN: BY GEAR

Item	Haul seines	Gill nets		Lines		Pound nets
		"Shoal" 2⅛ to 3⅞ inches	"Shoal" 4 to 7 inches	Troll	Trot	
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessel		827	714		157	107
On boats and shore:						
Regular	40	345	250		18	253
Casual	9	232	157	1	13	30
Total	49	1,404	1,121	1	188	390
Vessels:						
Steam		23	16		6	
Net tonnage		468	362		182	
Motor		236	202		42	38
Net tonnage		2,686	2,446		553	287
Total vessels		259	218		48	38
Total net tonnage		3,154	2,808		735	287
Boats:						
Motor	13	166	109	1	8	98
Other	40	157	71		13	72
Accessory boats						14
Apparatus:						
Number	27	35,959	33,279	2	493	489
Length, yards	9,345					
Square yards		5,549,952	7,255,371			
Hooks				2	161,970	

Lake fisheries of the United States, 1936—Continued

OPERATING UNITS OF LAKE MICHIGAN: BY GEAR—Continued

Item	Trap nets	Fyke nets	Crawfish pots	Crowfoot bars	Picks	By hand	Total, exclusive of duplication
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessel	18	48					1,044
On boats and shore:							
Regular	61	108	8				599
Casual	33	20		151	113	65	652
Total	112	176	8	151	113	65	2,295
Vessels:							
Steam							29
Net tonnage							658
Motor	6	20					300
Net tonnage	46	144					3,429
Total vessels	6	20					329
Total net tonnage	46	144					4,087
Boats:							
Motor	36	46	4	105			392
Other	13	65	5	48	113	26	472
Accessory boats							14
Apparatus:							
Number	395	657	1,040	257	113		

OPERATING UNITS OF LAKE SUPERIOR: BY GEAR

Item	Haul seines	Gill nets		Lines		Pound nets	Trap nets	Fyke nets	Total, exclusive of duplication
		"Shoal" 2⅛ to 3⅛ inches	"Shoal" 4 to 7 inches	Troll	Trot				
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
On vessels		93	112		52	19	3	6	145
On boats and shore:									
Regular	8	578	457	6	295	86	18	7	796
Casual	8	150	78	7	29	1	4	1	199
Total	16	821	647	13	376	106	25	14	1,140
Vessels:									
Steam		1	4		1				4
Net tonnage		24	109		32				109
Motor		36	30		17	6	1	2	47
Net tonnage		307	260		150	55	9	11	437
Total vessels		37	34		18	6	1	2	51
Total net tonnage		331	369		182	55	9	11	546
Boats:									
Motor	3	181	200	5	130	36	8	3	288
Other	4	382	170	1	90	24	5	4	436
Apparatus:									
Number	8	10,036	10,399	31	1,830	141	96	14	
Length, yards	1,055								
Square yards		2,177,178	2,927,984						
Hooks				217	326,000				

Lake fisheries of the United States, 1936—Continued

OPERATING UNITS OF LAKE OF THE WOODS, RAINY LAKE, AND NAMAKAN LAKE: By gear

Item	Gill nets, "shoal" 4 to 7 inches	Pound nets	Fyke nets	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*
Fishermen, on boats and shore, regular	82	45	45	135
Boats:				
Motor	60	17	21	79
Other	----------	6	----------	6
Apparatus:				
Number	239	73	95	----------
Square yards	75,022	----------	----------	----------

CATCH: By gear

Species	New York							
	Haul seines		Gill nets		Trot lines		Trap nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike	800	$75	647,600	$39,600	----------	----------	3,900	$297
Bowfin	----------	----------	----------	----------	----------	----------	200	2
Burbot	----------	----------	----------	----------	----------	----------	8,800	222
Carp	----------	----------	100	2	----------	----------	12,700	355
Catfish and bullheads	6,300	376	2,000	122	100	$16	45,600	2,829
Cisco	----------	----------	1,800	212	----------	----------	----------	----------
Eels	----------	----------	----------	----------	400	44	39,900	1,330
Lake herring	----------	----------	217,600	15,238	----------	----------	5,500	385
Lake trout	----------	----------	4,700	625	----------	----------	4,700	662
Pike or pickerel (jacks)	100	5	400	29	----------	----------	8,200	573
Rock bass	----------	----------	200	4	----------	----------	3,900	98
Sturgeon	----------	----------	500	174	16,000	5,000	1,400	435
Sucker "mullet"	1,200	42	8,100	245	200	3	31,800	974
Sunfish	----------	----------	----------	----------	----------	----------	14,200	284
White bass	----------	----------	100	4	----------	----------	----------	----------
Whitefish, common	----------	----------	41,400	7,111	----------	----------	34,600	5,197
Yellow perch	----------	----------	36,600	2,491	----------	----------	29,900	1,961
Yellow pike	----------	----------	700	85	----------	----------	14,800	1,807
Total	8,400	498	961,800	65,942	16,700	5,063	260,100	17,438

Species	New York—Continued				Pennsylvania			
	Fyke nets		Total		Gill nets		Pound nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike	----------	----------	652,300	$39,972	2,250,700	$135,044	207,700	$12,563
Bowfin	----------	----------	200	2	----------	----------	----------	----------
Burbot	----------	----------	8,800	222	1,000	10	3,000	30
Carp	400	$11	13,200	372	----------	----------	2,800	55
Catfish and bullheads	27,300	2,395	81,300	5,761	----------	----------	2,100	105
Cisco	----------	----------	1,800	212	44,200	4,417	6,500	653
Eels	3,900	131	44,200	1,505	----------	----------	----------	----------
Lake herring	----------	----------	223,100	15,623	----------	----------	----------	----------
Lake trout	300	43	9,700	1,330	100	8	----------	----------
Pike or pickerel (jacks)	1,500	106	10,200	713	----------	----------	----------	----------
Rock bass	----------	----------	4,100	102	----------	----------	----------	----------
Sheepshead	----------	----------	----------	----------	2,300	36	7,400	148
Sturgeon	----------	----------	17,900	5,609	----------	----------	800	225
Sucker "mullet"	3,000	91	44,300	1,355	6,800	80	3,600	73
Sunfish	700	14	14,900	298	----------	----------	----------	----------
White bass	----------	----------	100	4	2,400	116	8,200	410
Whitefish:								
Common	----------	----------	76,000	12,308	717,200	143,443	84,200	16,845
Menominee	100	7	100	7	----------	----------	----------	----------
Yellow perch	6,100	365	72,600	4,817	86,600	5,733	13,700	925
Yellow pike	----------	----------	15,500	1,892	700	69	14,600	1,194
Total	43,300	3,163	1,290,300	92,104	3,112,000	288,956	354,600	33,226

Lake fisheries of the United States, 1936—Continued

CATCH: By gear—Continued

Species	Pennsylvania—Continued				Ohio			
	Trap nets		Total		Haul seines		Gill nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike	378,500	$22,712	2,836,900	$170,319			1,400,500	$84,032
Burbot	1,500	15	5,500	55	100	$1	18,600	186
Carp	100	4	2,900	59	996,200	19,925	76,900	1,538
Catfish and bullheads	700	35	2,800	140	160,200	8,010	2,800	126
Cisco	2,600	256	53,300	5,326			11,500	1,270
Goldfish					319,300	9,579	3,600	108
Lake trout			100	8				
Mooneye					6,100	182		
Sauger					9,300	558	672,900	40,373
Sheepshead	1,400	43	11,100	227	547,500	10,951	29,000	580
Sturgeon			800	225	200	60	4,100	1,237
Sucker "mullet"	8,500	171	18,900	324	26,300	525	26,200	525
White bass	1,500	54	12,100	580	48,500	2,405	10,800	538
Whitefish, common	2,300	449	803,700	160,737			144,400	28,887
Yellow perch	30,900	1,909	131,200	8,567	2,000	130	524,200	40,575
Yellow pike	4,100	335	19,400	1,598	30,400	2,734	56,300	5,081
Total	432,100	25,983	3,898,700	348,165	2,146,100	55,060	2,981,800	205,056

Species	Ohio—Continued					
	Trammel nets		Trap nets		Fyke nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike			15,046,500	$902,790	300	$20
Burbot			427,600	4,276		
Carp	137,500	$2,751	764,700	15,294	29,600	592
Catfish and bullheads	1,300	63	324,000	17,202	46,800	2,340
Cisco			1,400	149		
Goldfish	700	22	6,200	306	300	9
Mooneye			1,700	52	1,000	30
Sauger			1,000,500	60,031	21,300	1,278
Sheepshead	1,900	38	2,704,900	54,098	113,100	2,262
Sturgeon			1,400	429		
Sucker "mullet"			725,300	14,506	69,300	1,385
White bass			433,600	24,178	102,700	5,134
Whitefish common			183,900	36,782	2,100	411
Yellow perch			1,349,800	87,736	8,800	572
Yellow pike			2,247,700	202,297	148,900	13,401
Total	141,400	2,874	25,269,200	1,420,126	544,200	27,434

Species	Ohio—Continued				Michigan			
	By hand		Total		Haul seines		Gill nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike			16,447,300	$986,842				
Bowfin					600	$6		
Burbot			446,300	4,463	100	1	6,600	$101
Carp			2,004,900	40,100	1,140,800	34,225	17,800	532
Catfish and bullheads			535,100	27,741	40,200	2,495	100	6
Chubs							1,998,400	259,767
Cisco			12,900	1,419				
Goldfish			330,100	10,024	1,400	14		
Lake herring					33,800	845	4,653,500	116,337
Lake trout							4,031,800	564,443
Mooneye			8,800	264				
Pike or pickerel (jacks)					5,200	421	3,000	245
Rock bass					5,300	213		
Sauger			1,704,000	102,240	1,600	108	12,500	875
Sheepshead			3,396,400	67,929	22,000	659		
Smelt							11,100	443
Sturgeon			5,700	1,726				
Sucker "mullet"			847,100	16,941	132,100	3,530	336,100	8,106
White bass			645,600	32,255	300	9		
Whitefish:								
Common			330,400	66,080			829,700	149,332
Menominee							108,100	6,481
Yellow perch			1,884,800	129,013	24,300	1,945	554,700	44,376
Yellow pike			2,483,300	223,513	154,800	21,663	127,200	17,823
Mussel shells	16,000	$360	16,000	360				
Total	16,000	360	31,098,700	1,710,910	1,562,500	66,134	12,690,600	1,168,867

Lake fisheries of the United States, 1936—Continued

CATCH: BY GEAR—Continued

Species	Michigan—Continued							
	Lines				Pound nets		Trap nets	
	Troll		Trot					
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Burbot			900	$14			700	$11
Carp			300	8	41,800	$1,253	103,500	3,104
Catfish and bullheads			2,000	135	2,000	122	76,300	4,991
Chubs					100	10	100	7
Lake herring					3,387,100	84,676	1,047,400	26,182
Lake trout	39,000	$5,450	1,465,400	205,157	126,600	17,721	180,900	25,327
Pike or pickerel (jacks)					900	71	19,800	1,585
Rock bass					200	7	7,100	282
Sauger					500	37	31,100	2,178
Sheepshead			1,500	46	11,700	351	13,600	409
Smelt					108,700	4,346	200	9
Sucker "mullet"			100	2	102,300	2,600	3,070,200	80,965
White bass							100	2
Whitefish:								
Common					456,500	82,162	1,260,500	226,880
Menominee					3,900	232	16,500	994
Yellow perch			4,900	393	25,800	2,061	871,460	69,720
Yellow pike					134,100	18,782	1,244,700	174,257
Total	39,000	5,450	1,475,100	205,755	4,402,200	214,431	7,944,100	616,903

Species	Michigan—Continued					
	Fyke nets		Crowfoot bars		Picks	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin	100	$1				
Burbot	1,900	27				
Carp	191,300	5,741				
Catfish and bullheads	38,800	1,496				
Goldfish	4,500	45				
Lake herring	8,300	207				
Lake trout	2,400	333				
Pike or pickerel (jacks)	8,500	684				
Rock bass	5,000	200				
Sauger	31,200	2,179				
Sheepshead	63,700	1,910				
Smelt	100	5				
Sucker "mullet"	263,300	7,018				
White bass	5,800	202				
Whitefish:						
Common	3,200	581				
Menominee	400	25				
Yellow perch	78,900	5,907				
Yellow pike	151,000	21,150				
Mussel shells			353,300	$12,364	310,600	$10,046
Pearls and slugs				286		267
Total	858,400	47,711	353,300	12,650	310,600	10,313

Lake fisheries of the United States, 1936—Continued

CATCH: By GEAR—Continued

Species	Michigan—Continued				Indiana			
	By hand		Total		Gill nets		Pound nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin			700	$7				
Burbot			10,200	154	7,600	$76		
Carp			1,495,500	44,863			4,800	$144
Catfish and bullheads			159,400	9,245				
Chubs			1,998,600	259,784	271,700	27,170		
Goldfish			5,900	59				
Lake herring			9,130,100	228,247	36,200	1,448	10,000	400
Lake trout			5,846,100	818,431	130,000	13,000		
Pike or pickerel (jacks)			37,400	3,006				
Rock bass			17,600	702				
Sauger			76,900	5,377				
Sheepshead			112,500	3,375				
Smelt			120,100	4,803				
Steelhead trout					2,000	300		
Sucker "mullet"			3,904,100	102,221	500	5	1,000	10
White bass			6,200	213				
Whitefish:								
Common			2,549,900	458,955	1,000	180	500	90
Menominee			128,900	7,732				
Yellow perch			1,560,000	124,402	41,400	2,486	4,800	288
Yellow pike			1,811,800	253,675				
Mussel shells	37,700	$1,259	701,600	23,669				
Pearls and slugs		22		575				
Total	37,700	1,281	29,673,500	2,349,495	490,400	44,665	21,100	932

Species	Indiana—Continued							
	Trap nets		Crowfoot bars		By hand		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Burbot							7,600	$76
Carp							4,800	144
Chubs							271,700	27,170
Lake herring	10,000	$400					56,200	2,248
Lake trout							130,000	13,000
Steelhead trout							2,000	300
Sucker "mullet"	5,000	50					6,500	65
Whitefish, common	5,000	900					6,500	1,170
Yellow perch	10,000	600					56,200	3,374
Yellow pike	2,000	300					2,000	300
Mussel shells			95,000	$2,125	45,000	$1,125	140,000	3,250
Total	32,000	2,250	95,000	2,125	45,000	1,125	683,500	51,097

Species	Illinois		Wisconsin					
	Gill nets		Haul seines		Gill nets		Trot lines	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Burbot					9,700	$96	4,200	$41
Carp			1,232,700	$36,980	91,900	2,759		
Catfish and bullheads			19,300	1,930	1,200	93		
Chubs	479,600	$57,522			3,550,300	426,029		
Lake herring	68,400	1,710	100	4	5,074,900	128,872		
Lake trout	273,500	41,025			1,949,900	331,397	416,700	74,409
Pike or pickerel (jacks)					6,000	713	200	23
Smelt					565,200	16,924		
Sucker "mullet"			36,300	1,181	470,900	15,307		
Whitefish:								
Common					104,100	22,655		
Menominee					32,000	1,923		
Yellow perch	547,000	32,820	1,000	70	556,600	38,963	3,000	215
Total	1,368,500	133,077	1,289,400	40,165	12,412,700	985,731	424,100	74,688

Lake fisheries of the United States, 1936—Continued

CATCH: BY GEAR—Continued

Species	Wisconsin—Continued							
	Pound nets		Fyke nets		Crawfish pots		Crowfoot bars	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Burbot	3,100	$30	2,400	$23				
Carp	6,900	205	105,200	3,150				
Catfish and bullheads	100	4	64,700	3,327				
Chubs	40,100	4,817						
Lake herring	936,200	23,403	25,600	638				
Lake trout	385,200	68,508	1,100	200				
Pike or pickerel (jacks)	15,700	2,315	5,700	671				
Smelt	402,300	12,068	114,400	3,432				
Sucker "mullet"	120,400	3,912	222,400	7,225				
Whitefish:								
Common	174,900	36,252	500	98				
Menominee	2,600	156						
Yellow perch	173,400	12,138	810,200	56,706				
Crawfish					41,500	$4,150		
Mussel shells							465,500	$7,725
Total	2,260,900	163,808	1,352,200	75,470	41,500	4,150	465,500	7,725

Species	Wisconsin—Continued				Minnesota			
	By hand		Total		Gill nets		Trot lines	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Burbot			19,400	$190	10,600	$260		
Carp			1,436,700	43,094	1,400	19		
Catfish and bullheads			85,300	5,354	9,900	519		
Chubs			3,590,400	430,846	24,900	2,842		
Lake herring			6,036,800	152,917	5,243,300	171,891		
Lake trout			2,752,900	474,514	286,900	34,484	106,300	$11,360
Pike or pickerel (jacks)			27,600	3,722	147,400	5,123		
Sauger					305,700	13,789		
Smelt			1,081,900	32,424				
Sturgeon					500	155		
Sucker "mullet"			850,000	27,625	130,900	1,889		
Tullibees					86,700	1,557		
Whitefish:								
Common			279,500	59,005	56,500	6,452		
Menominee			34,600	2,079	3,600	204		
Yellow perch			1,544,200	108,092	130,900	7,685		
Yellow pike					572,600	39,111		
Crawfish			41,500	4,150				
Mussel shells	24,000	$408	489,500	8,133				
Total	24,000	408	18,270,300	1,352,145	7,011,800	285,980	106,300	11,360

Species	Minnesota—Continued					
	Pound nets		Fyke nets		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Burbot	52,700	$883	68,500	$640	131,800	$1,783
Carp	9,500	105	3,000	31	13,900	155
Catfish and bullheads	700	44	50,100	2,913	60,700	3,476
Chubs					24,900	2,842
Crappie	100	5	100	6	200	11
Lake herring					5,243,300	171,891
Lake trout					393,200	45,844
Pike or pickerel (jacks)	66,300	2,505	32,100	1,018	245,800	8,646
Sauger	64,800	3,587	20,900	1,120	391,400	18,496
Sturgeon	400	118			900	273
Sucker "mullet"	51,200	618	52,300	605	234,400	3,112
Tullibees	16,400	363			103,100	1,920
Whitefish:						
Common	28,100	3,347	400	42	85,000	9,841
Menominee					3,600	204
Yellow perch	11,500	704	18,300	1,185	160,700	9,574
Yellow pike	262,600	28,682	64,900	6,589	900,100	74,382
Total	564,300	40,961	310,600	14,149	7,993,000	352,450

Lake fisheries of the United States, 1936—Continued

CATCH: BY LAKES

Species	Lake Ontario		Lake Erie			
	New York		New York		Pennsylvania	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike	27,900	$2,507	624,400	$37,465	2,836,900	$170,319
Bowfin	200	2				
Burbot	6,900	173	1,900	49	5,500	55
Carp	12,900	365	300	7	2,900	59
Catfish and bullheads	80,800	5,732	500	29	2,800	140
Cisco			1,800	212	53,300	5,326
Eels	44,200	1,505				
Lake herring	223,100	15,623				
Lake trout	8,200	1,155	1,500	175	100	8
Pike or pickerel (jacks)	10,200	713				
Rock bass	4,100	102				
Sheepshead					11,100	227
Sturgeon	12,800	3,932	5,100	1,677	800	225
Sucker "mullet"	38,000	1,139	6,300	216	18,900	324
Sunfish	14,900	298				
White bass			100	4	12,100	580
Whitefish:						
Common	53,100	7,962	22,900	4,346	803,700	160,737
Menominee	100	7				
Yellow perch	54,600	3,376	18,000	1,441	131,200	8,567
Yellow pike	9,100	1,187	6,400	705	19,400	1,598
Total	601,100	45,778	689,200	46,326	3,898,700	348,165

Species	Lake Erie—Continued					
	Ohio		Michigan		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike	16,447,300	$986,842			19,908,600	$1,194,626
Bowfin			600	$6	600	6
Burbot	446,300	4,463	800	11	454,500	4,578
Carp	2,004,900	40,100	678,900	20,366	2,687,000	60,532
Catfish and bullheads	535,100	27,741	35,500	1,543	573,900	29,453
Cisco	12,900	1,419			68,000	6,957
Goldfish	330,100	10,024	5,900	59	336,000	10,083
Lake trout					1,600	183
Mooneye	8,800	264			8,800	264
Pike or pickerel (jacks)			1,200	99	1,200	99
Rock bass			3,200	130	3,200	130
Sauger	1,704,000	102,240	33,500	2,339	1,737,500	104,579
Sheepshead	3,396,400	67,929	93,200	2,795	3,500,700	70,951
Sturgeon	5,700	1,726			11,600	3,628
Sucker "mullet"	847,100	16,941	73,800	1,992	946,100	19,473
White bass	645,600	32,255	6,100	211	663,900	33,050
Whitefish, common	330,400	66,080	1,400	247	1,158,400	231,410
Yellow perch	1,884,800	129,013	16,500	923	2,050,500	139,944
Yellow pike	2,483,300	223,513	127,800	17,883	2,636,900	243,699
Mussel shells [1]	16,000	360	12,000	368	28,000	728
Pearls and slugs [1]				19		19
Total	31,098,700	1,710,910	1,090,400	48,991	36,777,000	2,154,392

[1] From tributary streams.

Lake fisheries of the United States, 1936—Continued

CATCH: BY LAKES—Continued

Species	Lake Huron		Lake Michigan			
	Michigan		Michigan		Indiana	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin	100	$1				
Burbot	1,300	21	7,300	$109	7,600	$76
Carp	770,000	23,101	46,600	1,396	4,800	144
Catfish and bullheads	122,000	7,598	1,900	104		
Chubs	335,100	43,551	1,500,700	195,079	271,700	27,170
Lake herring	3,982,200	99,554	1,490,700	37,265	56,200	2,248
Lake trout	1,399,900	195,987	2,126,700	297,734	130,000	13,000
Pike or pickerel (jacks)	23,400	1,884	11,800	948		
Rock bass	12,200	486	2,200	86		
Sauger	38,700	2,705	3,400	241		
Sheepshead	8,300	250	11,000	330		
Smelt			120,100	4,803		
Steelhead trout					2,000	300
Sucker "mullet"	1,813,700	47,466	1,899,300	49,990	6,500	65
White bass	100	2				
Whitefish:						
Common	1,442,200	259,589	876,400	157,753	6,500	1,170
Menominee	44,600	2,680	38,100	2,283		
Yellow perch	1,175,300	94,022	361,400	28,910	56,200	3,374
Yellow pike	1,565,200	219,132	114,100	15,990	2,000	300
Mussel shells [1]	55,800	1,695	633,800	21,606	140,000	3,250
Pearls and slugs [1]		45		511		
Total	12,790,100	999,769	9,245,500	815,138	683,500	51,097

Species	Lake Michigan—Continued				Total	
	Illinois		Wisconsin			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Burbot			18,500	$181	33,400	$366
Carp			1,434,900	43,039	1,486,300	44,579
Catfish and bullheads			85,300	5,354	87,200	5,458
Chubs	479,600	$57,522	3,422,100	410,652	5,674,100	690,423
Lake herring	68,400	1,710	3,180,700	79,516	4,796,000	120,739
Lake trout	273,500	41,025	2,232,400	383,596	4,762,600	735,355
Pike or pickerel (jacks)			4,200	487	16,000	1,435
Rock bass					2,200	86
Sauger					3,400	241
Sheepshead					11,000	330
Smelt			1,081,900	32,424	1,202,000	37,227
Steelhead trout					2,000	300
Sucker "mullet"			780,100	25,350	2,685,900	75,405
Whitefish:						
Common			142,600	28,884	1,025,500	187,807
Menominee			28,700	1,724	66,800	4,007
Yellow perch	547,000	32,820	1,543,200	108,019	2,507,800	173,123
Yellow pike					116,100	16,290
Crawfish			41,500	4,150	41,500	4,150
Mussel shells [1]			489,500	8,133	1,263,300	32,989
Pearls and slugs [1]						511
Total	1,368,500	133,077	14,485,600	1,131,509	25,783,100	2,130,821

[1] From tributary streams.

Lake fisheries of the United States, 1936—Continued

CATCH: By lakes—Continued

Species	Lake Superior					
	Michigan		Wisconsin		Minnesota	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Burbot	800	$13	900	$9		
Carp			1,800	55		
Chubs	162,800	21,154	168,300	20,194	24,900	$2,842
Lake herring	3,657,200	91,428	2,856,100	73,401	5,243,300	171,891
Lake trout	2,319,500	324,710	520,500	90,918	393,200	45,844
Pike or pickerel (jacks)	1,000	75	23,400	3,235	200	18
Sauger	1,300	92				
Sucker "mullet"	117,300	2,773	69,900	2,275	3,500	105
Whitefish:						
Common	229,900	41,366	136,900	30,121	7,300	1,109
Menominee	46,200	2,769	5,900	355	3,600	204
Yellow perch	6,800	547	1,000	73		
Yellow pike	4,700	670				
Total	6,547,500	485,597	3,784,700	220,636	5,676,000	222,013

Species	Lake Superior—Con.		Lake of the Woods, Rainy Lake, and Namakan Lake		Total, all lakes	
	Total		Minnesota			
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike					19,936,500	$1,197,133
Bowfin					900	9
Burbot	1,700	$22	131,800	$1,783	629,600	6,943
Carp	1,800	55	13,900	155	4,971,900	128,787
Catfish and bullheads			60,700	3,476	924,600	51,717
Chubs	356,000	44,190			6,365,200	778,164
Cisco					68,000	6,957
Crappie			200	11	200	11
Eels					44,200	1,505
Goldfish					336,000	10,083
Lake herring	11,756,600	336,720			20,757,900	572,636
Lake trout	3,233,200	461,472			9,405,500	1,394,152
Mooneye					8,800	264
Pike or pickerel (jacks)	24,600	3,328	245,600	8,628	321,000	16,087
Rock bass					21,700	804
Sauger	1,300	92	391,400	18,496	2,172,300	126,113
Sheepshead					3,520,000	71,531
Smelt					1,202,000	37,227
Steelhead trout					2,000	300
Sturgeon			900	273	25,300	7,833
Sucker "mullet"	190,700	5,153	230,900	3,007	5,905,300	151,643
Sunfish					14,900	298
Tullibees			103,100	1,920	103,100	1,920
White bass					664,000	33,052
Whitefish:						
Common	374,100	72,596	77,700	8,732	4,131,000	768,096
Menominee	55,700	3,328			167,200	10,022
Yellow perch	7,800	620	160,700	9,574	5,956,700	420,659
Yellow pike	4,700	670	900,100	74,382	5,232,100	555,360
Crawfish					41,500	4,150
Mussel shells [1]					1,347,100	35,412
Pearls and slugs [1]						575
Total	16,008,200	928,246	2,317,000	130,437	94,276,500	6,389,443

[1] From tributary streams.

Industries related to the fisheries of the Lake States, 1936

OPERATING UNITS, SALARIES, AND WAGES

Item	New York	Pennsylvania	Ohio	Michigan	Indiana and Illinois	Wisconsin	Minnesota	Total
Transporting:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Persons engaged			14					14
Vessels, motor			8					8
Net tonnage			115					115
Wholesale and manufacturing:								
Establishments	15	7	42	56	44	37	13	214
Persons engaged:								
Proprietors	13	8	35	43	20	29	6	154
Salaried employees	29	6	66	63	199	56	29	448
Wage earners:								
Average for season	128	105	375	380	524	529	182	2, 223
Average for year	86	46	212	158	430	172	74	1, 178
Paid to salaried employees	$42, 307	$12, 808	$197, 567	$103, 927	$509, 837	$78, 647	$49, 399	$994, 492
Paid to wage earners	$99, 033	$58, 828	$273, 524	$181, 436	$555, 927	$201, 555	$74, 312	$1, 444, 615
Total salaries and wages	$141, 340	$71, 636	$471, 091	$285, 363	$1, 065, 764	$280, 202	$123, 711	$2, 439. 107
Fishermen manufacturing	2			19		59	400	480

PRODUCTS MANUFACTURED

Item	New York		Pennsylvania		Ohio		Michigan	
By manufacturing establishments:	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Carp, smoked—pounds					2, 100	$475	(1)	(1)
Chubs, smoked—do	(1)	(1)			117, 000	22, 150	497, 500	$140, 550
Eels, smoked—do	(1)	(1)						
Lake herring:								
Fresh fillets—do					(1)	(1)	(1)	(1)
Salted—do							1, 540, 900	57, 715
Smoked—do	(1)	(1)					117, 943	15, 720
Lake trout, smoked—do					(1)	(1)	104, 250	27, 120
Pike, pickerel and sauger:								
Fresh fillets—do	388, 170	$74, 621	586, 013	$115, 590	1, 899, 069	401, 844		
Frozen fillets—do	(1)	(1)	(1)	(1)	228, 062	50, 935		
Sablefish, smoked—do					(1)	(1)	(1)	(1)
Salmon:								
Kippered—do							(1)	(1)
Smoked—do	(1)	(1)			20, 000	6, 000	72, 600	23, 880
Sheepshead, fresh fillets—pounds					61, 652	3, 237		
Sturgeon, smoked—do	(1)	(1)			(1)	(1)		
Tullibees, smoked—do					(1)	(1)	(1)	(1)
White bass, fresh fillets—pounds			(1)	(1)	15, 386	2, 064		
Whitefish:								
Fresh fillets—do			(1)	(1)	(1)	(1)		
Smoked—do	(1)	(1)			(1)	(1)	56, 010	15, 611
Yellow perch:								
Fresh fillets—do	5, 300	1, 060	6, 625	1, 506	116, 335	26, 913	(1)	(1)
Frozen fillets—do			(1)	(1)	8, 830	2, 366		
Unclassified products:								
Fillets, fresh and frozen—pounds	[3] 72, 800	[3] 15, 210	[4] 55, 051	[4] 11, 094	(5)	(5)	(5)	(5)
Smoked—do	[7] 188, 300	[7] 43, 946			(5)	(5)	(5)	(5)
Miscellaneous—do					[11] 96, 600	[11] 25, 270	[12] 315, 705	[12] 72, 515
Total—do	654, 570	134, 837	647, 689	128, 190	2, 565, 034	541, 254	2, 704, 908	353, 111
By fishermen:								
Chubs, smoked—do							7, 500	1, 850
Lake herring:								
Salted—do							200, 000	8, 000
Smoked—do							1, 000	150
Lake trout:								
Salted—do							25, 000	2, 250
Smoked—do							8, 750	2, 625
Pike, smoked—do							200	30
Suckers, smoked—do							500	75
Whitefish, smoked—do	8, 000	2, 800					2, 750	825
Yellow perch, smoked—pounds							200	30
Total—do	8, 000	2, 800					245, 900	15. 835
Grand total—do	662, 570	137, 637	647, 689	128, 190	2, 565, 034	541, 254	2, 950, 808	368, 946

See footnotes at end of table.

Industries related to the fisheries of the Lake States, 1936—Continued

PRODUCTS MANUFACTURED—Continued

Item	Illinois [2]		Wisconsin		Minnesota	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
By manufacturing establishments:						
Carp, smoked—pounds	[1]	[1]	558,571	$121,974		
Chubs, smoked—do	[2] 1,213,218	[2] $318,572				
Eels, smoked—do	17,703	4,423				
Lake herring:						
Fresh fillets—do	[1]	[1]	165,700	14,337		
Salted—do			1,983,590	74,860		
Smoked—do	[1]	[1]	621,250	45,995	[1]	[1]
Lake trout:						
Fresh fillets—do	10,586	2,618	[1]	[1]		
Smoked—do	[2] 71,025	[2] 20,384	261,389	60,990	[1]	[1]
Pike, pickerel and sauger, fresh fillets—pounds	1,544,417	329,781	110,900	25,370		
Sablefish, smoked—do	12,940	3,770				
Salmon:						
Kippered—do	40,200	14,060			[1]	[1]
Smoked—do	480,823	171,024	124,000	37,200	[1]	[1]
Sturgeon, smoked—do	7,832	6,562				
Tullibees, smoked—do	48,070	8,517			[1]	[1]
White bass, fresh fillets—do	[1]	[1]				
Whitefish:						
Fresh fillets—do	27,687	5,905				
Smoked—do	[1]	[1]	15,750	3,450	[1]	[1]
Yellow perch, fresh fillets—do	80,826	19,930	148,200	35,084		
Unclassified products:						
Fillets, fresh and frozen—do	[6] 21,201	[6] 3,309	[5]	[5]		
Smoked—do	[8] 41,762	[8] 7,538	[9] 136,500	[9] 15,270	[10] 528,400	[10] $103,936
Miscellaneous—do				[12] 34,962		[14] 12,950
Total—do	3,618,290	916,393		469,492		116,886
By fishermen:						
Chubs, smoked—do			30,000	6,900		
Lake herring, salted—do			187,345	5,403	500,000	20,000
Lake trout, smoked—do			2,500	500		
Total—do			219,845	12,803	500,000	20,000
Grand total—do	3,618,290	916,393		482,295		136,886

[1] This item has been included under "Unclassified products."

[2] A small amount of smoked chubs, lake trout, and whitefish produced in Indiana is included with the production for Illinois.

[3] Includes fresh fillets of haddock, halibut, and lake trout; and frozen fillets of pike.

[4] Includes fresh fillets of white bass and whitefish; and frozen fillets of pike and yellow perch.

[5] The production of this item has been included under "Miscellaneous."

[6] Includes fresh fillets of catfish and bullheads, lake herring, mackerel, salmon, suckers, tullibees, and white bass.

[7] Includes smoked chubs, eels, goldeye, lake herring, salmon, sturgeon, tullibees, and whitefish.

[8] Includes smoked buffalofish, carp, goldeye, lake herring, shad, and whitefish.

[9] Includes smoked carp, sablefish, salmon, and tullibees.

[10] Includes smoked cisco, lake herring, sea herring, lake trout, salmon, tullibees, and whitefish, and kippered salmon.

[11] Includes fresh fillets of lake herring and whitefish; and smoked lake trout, sablefish, sturgeon, tullibees, and whitefish.

[12] Includes fresh fillets of lake herring and yellow perch; frozen fillets of lake herring; smoked butterfish, carp, mackerel, sablefish, and tullibees; and kippered salmon.

[13] Includes fresh fillets of lake trout, salted chubs, canned whitefish caviar, burbot liver oil, and freshwater mussel-shell poultry feed and lime.

[14] Includes salted lake herring, burbot-liver oil, and burbot and tullibee meal.

NOTE.—The total value of the manufactured products for the Lake States was as follows: By manufacturing establishments, $2,660,163; and by fishermen, $51,438. Some of the above products may have been manufactured from products imported from another State or a foreign country; therefore, they cannot be correlated directly with the catch within the State. All of the persons engaged in the preparation of fishermen's manufactured products have also been included as fishermen and 2 of the persons shown on transporting craft have also been included as fishermen. This should be considered when computing the total number of persons in the fishery industries exclusive of duplication.

Lake fisheries of the United States and Canada, 1935

CATCH: BY LAKES

Species	Lake Ontario			Lake Erie		
	United States	Canada	Total	United States	Canada	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Blue pike	135,700	38,400	174,100	9,686,100	5,064,300	14,750,400
Bowfin	100	(1)	100			
Burbot	4,800	(1)	4,800	303,900	(1)	303,900
Carp	24,000	200,900	224,900	1,949,800	619,000	2,568,800
Catfish and bullheads	123,700	185,700	309,400	552,400	64,100	616,500
Cisco				71,500	96,200	167,700
Eels	46,200	60,900	107,100			
Gizzard shad				5,300	(1)	5,300
Goldfish				158,300	(1)	158,300
Lake herring	166,500	835,700	1,002,200			
Lake trout	6,800	244,900	251,700	100	300	400
Mooneye				9,600	(1)	9,600
Pike or pickerel (jacks)	12,600	111,800	124,400	1,500	8,200	9,700
Rock bass	8,900	(1)	8,900	3,200	(1)	3,200
Sauger				1,537,400	(1)	1,537,400
Sheepshead				2,351,100	(1)	2,351,100
Sturgeon	9,700	4,800	14,500	18,200	22,400	40,600
Sucker "mullet"	50,600	(1)	50,600	1,085,900	(1)	1,085,900
Sunfish	41,400	(1)	41,400			
White bass				739,300	(1)	739,300
Whitefish, common	40,500	657,400	697,900	994,900	1,190,100	2,185,000
Yellow perch	80,200	143,100	223,300	9,044,900	5,633,500	14,678,400
Yellow pike	18,300	28,500	46,800	1,783,700	319,300	2,103,000
Mussel shells				59,400	(1)	59,400
Miscellaneous		272,600	272,600		1,411,200	1,411,200
Total	770,000	2,784,700	3,554,700	30,356,500	14,428,600	44,785,100

Species	Lake Huron			Lake Michigan	Lake Superior		
	United States	Canada	Total	United States	United States	Canada	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Blue pike		1,300	1,300				
Bowfin	1,000	(1)	1,000				
Burbot	5,200	(1)	5,200	39,900	1,400	(1)	1,400
Carp	1,079,300	22,900	1,102,200	1,054,000	100	100	200
Catfish and bullheads	71,100	5,600	76,700	41,900	200	(1)	200
Chubs	386,900	711,300	1,098,200	5,794,500	472,800	209,000	681,800
Lake herring	3,886,200	293,100	4,179,300	5,425,300	13,115,400	1,296,700	14,412,100
Lake trout	1,743,300	4,255,400	5,998,700	4,872,700	3,475,900	1,518,400	4,994,300
Pike or pickerel (jacks)	9,200	159,300	168,500	63,600	6,100	9,700	15,800
Rock bass	17,800	(1)	17,800	900			
Sauger	171,800	(1)	171,800	75,000	800	(1)	800
Sheepshead	10,800	(1)	10,800	11,700			
Smelt	1,800	(1)	1,800	832,500	200	(1)	200
Steelhead trout				2,000			
Sturgeon		16,400	16,400			100	100
Sucker "mullet"	1,761,100	(1)	1,761,100	2,550,600	221,900	(1)	221,900
Whitefish:							
Common	1,894,800	1,936,600	3,831,400	1,697,100	512,300	377,400	889,700
Menominee	71,200	(1)	71,200	129,500	45,900	(1)	45,900
Yellow perch	982,900	185,800	1,168,700	1,740,200	1,100	400	1,500
Yellow pike	1,574,000	424,400	1,998,400	98,500	19,400	72,900	92,300
Crawfish				39,500			
Mussel shells	7,900	(1)	7,900	619,800			
Miscellaneous		365,600	365,600			93,200	93,200
Total	13,676,300	8,377,700	22,054,000	25,089,200	17,873,500	3,577,900	21,451,400

1 Where there has been a Canadian catch of these species it is included under "Miscellaneous."

Lake fisheries of the United States and Canada, 1935—Continued

CATCH: BY LAKES—Continued

Species	Namakan Lake			Rainy Lake		
	United States	Canada	Total	United States	Canada	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Burbot	1,000		1,000			
Chubs	300		300		2,500	2,500
Pike or pickerel (jacks)	8,700	3,600	12,300	48,400	186,900	235,300
Sauger				100	(1)	100
Sturgeon		1,800	1,800	300	200	500
Sucker "mullet"	200	(1)	200	1,800	(1)	1,800
Whitefish, common	20,100	20,100	40,200	80,200	33,500	113,700
Yellow perch	200	(1)	200	4,400	14,800	19,200
Yellow pike	18,100	15,100	33,200	60,300	181,200	241,500
Miscellaneous					118,400	118,400
Total	48,600	40,600	89,200	195,500	537,500	733,000

Species	Lake of the Woods			Total, all lakes		
	United States	Canada	Total	United States	Canada	Total
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Blue pike		1,100	1,100	9,821,800	5,105,100	14,926,900
Bowfin				1,100	(1)	1,100
Burbot	159,900	(1)	159,900	516,100	(1)	516,100
Carp	7,700	1,200	8,900	4,114,900	844,100	4,959,000
Catfish and bullheads	27,900	41,500	69,400	817,200	296,900	1,114,100
Chubs				6,654,500	922,800	7,577,300
Cisco				71,500	96,200	167,700
Crappie	400	(1)	400	400	(1)	400
Eels				46,200	60,900	107,100
Gizzard shad				5,300	(1)	5,300
Goldeye	200	(1)	200	200	(1)	200
Goldfish				158,300	(1)	158,300
Lake herring				22,593,400	2,425,500	25,018,900
Lake trout		27,600	27,600	10,098,800	6,046,600	16,145,400
Mooneye				9,600	(1)	9,600
Pike or pickerel (jacks)	246,500	482,800	729,300	396,600	962,300	1,358,900
Rock bass				30,800	(1)	30,800
Sauger	346,500	6,000	352,500	2,131,600	6,000	2,137,600
Sheepshead				2,373,600	(1)	2,373,600
Smelt				834,500	(1)	834,500
Steelhead trout				2,000	(1)	2,000
Sturgeon	700	100	800	28,900	45,800	74,700
Sucker "mullet"	183,300	300	183,600	5,855,400	300	5,855,700
Sunfish				41,400	(1)	41,400
Tullibees	131,600	82,200	213,800	131,600	82,200	213,800
White bass				739,300	(1)	739,300
Whitefish:						
Common	9,800	338,700	348,500	5,249,700	4,553,800	9,803,500
Menominee				246,600	(1)	246,600
Yellow perch	77,800	10,000	87,800	11,931,700	5,987,600	17,919,300
Yellow pike	1,020,700	904,800	1,925,500	4,593,000	1,946,200	6,539,200
Crawfish				39,500	(1)	39,500
Mussel shells				687,100	(1)	687,100
Miscellaneous		91,500	91,500		2,352,500	2,352,500
Total	2,213,000	1,987,800	4,200,800	90,222,600	31,734,800	121,957,400

[1] Where there has been a Canadian catch of these species it is included under "Miscellaneous."

Lake fisheries of the United States, 1935

CATCH: BY STATES

Species	New York		Pennsylvania		Ohio	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike	595,900	$33,872	2,083,900	$99,711	7,142,000	$357,100
Bowfin	100	4				
Burbot	5,200	278	6,300	62	296,400	2,964
Carp	33,700	908	3,000	88	1,279,000	25,580
Catfish and bullheads	124,500	6,978	2,800	139	489,500	20,474
Cisco	6,100	734	55,000	6,295	10,400	1,040
Eels	46,200	1,508				
Gizzard shad					5,300	53
Goldfish					152,800	1,530
Lake herring	166,500	16,220				
Lake trout	6,800	723	100	7		
Mooneye					9,500	99
Pike or pickerel (jacks)	12,600	781				
Rock bass	9,000	186				
Sauger					1,479,400	73,970
Sheepshead			12,400	429	2,270,300	50,635
Sturgeon	15,400	5,010	400	134	12,100	4,060
Sucker "mullet"	83,200	2,435	24,100	456	943,700	18,874
Sunfish	41,400	1,024				
White bass	1,500	32	33,700	1,233	692,500	41,550
Whitefish, common	69,600	8,570	487,000	78,837	476,700	71,510
Yellow perch	226,600	11,723	541,700	26,917	8,303,200	498,129
Yellow pike	31,000	3,280	20,800	2,641	1,628,000	162,800
Mussel shells [1]					54,000	1,080
Total	1,475,300	94,266	3,271,200	216,949	25,244,800	1,331,448

Species	Michigan		Indiana		Illinois	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin	1,000	$20				
Burbot	17,500	350	6,100	$61		
Carp	1,759,700	52,790	4,500	135		
Catfish and bullheads	133,100	6,993				
Chubs	2,378,000	166,456	232,400	23,240	520,000	$62,400
Goldfish	5,500	164				
Lake herring	7,878,100	236,345	35,000	1,400	65,000	1,625
Lake trout	6,789,800	1,018,475	119,800	11,980	260,000	39,000
Mooneye	100	1				
Pike or pickerel (jacks)	23,600	1,893				
Rock bass	21,800	653				
Sauger	305,600	18,328				
Sheepshead	90,900	2,727				
Smelt	44,200	2,212				
Steelhead trout			2,000	300		
Sucker "mullet"	3,932,500	157,323	1,500	15		
White bass	11,600	698				
Whitefish:						
Common	3,757,500	751,508	1,500	270		
Menominee	188,400	15,075				
Yellow perch	1,510,800	120,857	33,200	1,992	455,000	27,300
Yellow pike	1,796,300	269,464				
Mussel shells [1]	480,000	8,759	80,000	1,600		
Pearls and slugs [1]		183				
Total	31,126,000	2,831,274	516,000	40,993	1,300,000	130,325

[1] From tributary streams.

Lake fisheries of the United States, 1935—Continued

CATCH: BY STATES—Continued

Species	Wisconsin		Minnesota		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike					9,821,800	$490,683
Bowfin					1,100	24
Burbot	23,700	$237	160,900	$682	516,100	4,634
Carp	1,027,300	20,546	7,700	74	4,114,900	100,121
Catfish and bullheads	39,400	2,370	27,900	1,768	817,200	38,722
Chubs	3,454,000	312,935	70,100	5,932	6,654,500	570,963
Cisco					71,500	8,069
Crappie			400	38	400	38
Eels					46,200	1,508
Gizzard shad					5,300	53
Goldeye			200	4	200	4
Goldfish					158,300	1,694
Lake herring	6,537,900	130,757	7,910,900	163,976	22,593,400	550,323
Lake trout	2,543,500	325,583	378,800	40,450	10,098,800	1,436,218
Mooneye					9,600	100
Pike or pickerel (jacks)	55,500	5,546	304,900	9,295	396,600	17,515
Rock bass					30,800	839
Sauger			346,600	14,266	2,131,600	106,564
Sheepshead					2,373,600	53,791
Smelt	790,300	23,708			834,500	25,920
Steelhead trout					2,000	300
Sturgeon			1,000	250	28,900	9,454
Sucker "mullet"	675,100	19,691	195,300	2,590	5,855,400	201,384
Sunfish					41,400	1,024
Tullibees			131,600	701	131,600	701
White bass					739,300	43,513
Whitefish:						
Common	336,500	50,014	120,900	13,275	5,249,700	973,984
Menominee	50,100	2,900	8,100	432	246,600	18,407
Yellow perch	778,800	46,713	82,400	3,411	11,931,700	737,042
Yellow pike	17,800	2,138	1,099,100	95,119	4,593,000	535,442
Crawfish	39,500	3,556			39,500	3,556
Mussel shells [1]	73,100	731			687,100	12,170
Pearls and slugs [1]						183
Total	16,442,500	947,425	10,846,800	352,263	90,222,600	5,944,943

[1] From tributary streams.

NOTE.—Statistics of operating units were not obtained for 1935.

CATCH: BY LAKES

Species	Lake Ontario		Lake Erie			
	New York		New York		Pennsylvania	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike	135,700	$10,812	460,200	$23,060	2,083,900	$99,711
Bowfin	100	4				
Burbot	4,800	274	400	4	6,300	62
Carp	24,000	521	9,700	387	3,000	88
Catfish and bullheads	123,700	6,898	800	80	2,800	139
Cisco			6,100	734	55,000	6,295
Eels	46,200	1,508				
Lake herring	166,500	16,220				
Lake trout	6,800	723			100	7
Pike or pickerel (jacks)	12,600	781				
Rock bass	8,900	183	100	3		
Sheepshead					12,400	429
Sturgeon	9,700	3,019	5,700	1,991	400	134
Sucker "mullet"	50,600	1,240	32,600	1,195	24,100	456
Sunfish	41,400	1,024				
White bass			1,500	32	33,700	1,233
Whitefish, common	40,500	4,789	29,100	3,781	487,000	78,837
Yellow perch	80,200	4,336	146,400	7,387	541,700	26,917
Yellow pike	18,300	2,000	12,700	1,280	20,800	2,641
Total	770,000	54,332	705,300	39,934	3,271,200	216,949

Lake fisheries of the United States, 1935—Continued

CATCH: BY LAKES—Continued

Species	Lake Erie—Continued					
	Ohio		Michigan		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike	7,142,000	$357,100			9,686,100	$479,871
Burbot	296,400	2,964	800	$15	303,900	3,045
Carp	1,279,000	25,580	658,100	19,743	1,949,800	45,798
Catfish and bullheads	489,500	20,474	59,300	2,391	552,400	23,084
Cisco	10,400	1,040			71,500	8,069
Gizzard shad	5,300	53			5,300	53
Goldfish	152,800	1,530	5,500	164	158,300	1,694
Lake trout					100	7
Mooneye	9,500	99	100	1	9,600	100
Pike or pickerel (jacks)			1,500	124	1,500	124
Rock bass			3,100	93	3,200	96
Sauger	1,479,400	73,970	58,000	3,477	1,537,400	77,447
Sheepshead	2,270,300	50,635	68,400	2,053	2,351,100	53,117
Sturgeon	12,100	4,060			18,200	6,185
Sucker "mullet"	943,700	18,874	85,500	3,422	1,085,900	23,947
White bass	692,500	41,550	11,600	698	739,300	43,513
Whitefish, common	476,700	71,510	2,100	415	994,900	154,543
Yellow perch	8,303,200	498,129	53,600	4,283	9,044,900	536,716
Yellow pike	1,628,000	162,800	122,200	18,335	1,783,700	185,056
Mussel shells [1]	54,000	1,080	5,400	81	59,400	1,161
Pearls and slugs [1]				6		6
Total	25,244,800	1,331,448	1,135,200	55,301	30,356,500	1,643,632

Species	Lake Huron		Lake Michigan			
	Michigan		Michigan		Indiana	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin	1,000	$20				
Burbot	5,200	104	10,100	$203	6,100	$61
Carp	1,079,300	32,379	22,200	665	4,500	135
Catfish and bullheads	71,100	4,441	2,500	155		
Chubs	386,900	27,080	1,801,400	126,096	232,400	23,240
Lake herring	3,886,200	116,587	1,209,600	36,289	35,000	1,400
Lake trout	1,743,300	261,495	2,451,000	367,652	119,800	11,980
Pike or pickerel (jacks)	9,200	737	11,000	879		
Rock bass	17,800	535	900	25		
Sauger	171,800	10,306	75,000	4,497		
Sheepshead	10,800	323	11,700	351		
Smelt	1,800	90	42,200	2,112		
Steelhead trout					2,000	300
Sucker "mullet"	1,761,100	70,445	1,930,100	77,224	1,500	15
Whitefish:						
Common	1,894,800	378,962	1,431,700	286,344	1,500	270
Menominee	71,200	5,699	90,000	7,197		
Yellow perch	982,900	78,632	473,700	37,897	33,200	1,992
Yellow pike	1,574,000	236,106	95,900	14,393		
Mussel shells [1]	7,900	119	466,700	8,559	80,000	1,600
Pearls and slugs [1]		2		175		
Total	13,676,300	1,224,062	10,125,700	970,713	516,000	40,993

[1] From tributary streams.

Lake fisheries of the United States, 1935—Continued

CATCH: BY LAKES—Continued

Species	Lake Michigan—Continued					
	Illinois		Wisconsin		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Burbot			23,700	$237	39,900	$501
Carp			1,027,300	20,546	1,054,000	21,345
Catfish and bullheads			39,400	2,370	41,900	2,525
Chubs	520,000	$62,400	3,240,700	291,606	5,794,500	503,342
Lake herring	65,000	1,625	4,115,700	82,314	5,425,300	121,628
Lake trout	260,000	39,000	2,041,900	265,395	4,872,700	684,027
Pike or pickerel (jacks)			52,600	5,259	63,600	6,138
Rock bass					900	25
Sauger					75,000	4,497
Sheepshead					11,700	351
Smelt			790,300	23,708	832,500	25,820
Steelhead trout					2,000	300
Sucker "mullet"			618,000	18,570	2,550,600	95,809
Whitefish:						
Common			263,900	36,946	1,697,100	323,560
Menominee			39,500	2,371	129,500	9,568
Yellow perch	455,000	27,300	778,300	46,688	1,740,200	113,877
Yellow pike			2,600	317	98,500	14,710
Crawfish			39,500	3,556	39,500	3,556
Mussel shells [1]			73,100	731	619,800	10,890
Pearls and slugs [1]						175
Total	1,300,000	130,325	13,147,500	800,614	25,089,200	1,942,645

Species	Lake Superior					
	Michigan		Wisconsin		Minnesota	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Burbot	1,400	$28				
Carp	100	3				
Catfish and bullheads	200	6				
Chubs	189,700	13,280	213,300	$21,329	69,800	$5,929
Lake herring	2,782,300	83,469	2,422,200	48,443	7,910,900	163,976
Lake trout	2,595,500	389,328	501,600	60,188	378,800	40,450
Pike or pickerel (jacks)	1,900	153	2,900	287	1,300	91
Sauger	800	48				
Smelt	200	10				
Sucker "mullet"	155,800	6,232	56,100	1,121	10,000	255
Whitefish:						
Common	428,900	85,787	72,600	13,068	10,800	1,466
Menominee	27,200	2,179	10,600	529	8,100	432
Yellow perch	600	45	500	25		
Yellow pike	4,200	630	15,200	1,821		
Total	6,188,800	581,198	3,295,000	146,811	8,389,700	212,599

[1] From tributary streams.

Lake fisheries of the United States, 1935—Continued

CATCH: BY LAKES—Continued

Species	Lake Superior—Con. Total		Lake of the Woods, Rainy Lake, and Namakan Lake, Minnesota		Total, all lakes	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blue pike					9,821,800	$490,683
Bowfin					1,100	24
Burbot	1,400	$28	160,900	$682	516,100	4,634
Carp	100	3	7,700	74	4,114,900	100,121
Catfish and bullheads	200	6	27,900	1,768	817,200	38,722
Chubs	472,800	40,538	300	3	6,654,500	570,963
Cisco					71,500	8,069
Crappie			400	38	400	38
Eels					46,200	1,508
Gizzard shad					5,300	53
Goldeye			200	4	200	4
Goldfish					158,309	1,694
Lake herring	13,115,400	295,888			22,593,400	550,323
Lake trout	3,475,900	489,966			10,098,800	1,436,218
Mooneye					9,600	100
Pike or pickerel (jacks)	6,100	531	303,600	9,204	396,600	17,515
Rock bass					30,800	839
Sauger	800	48	346,600	14,266	2,131,600	106,564
Sheepshead					2,373,600	53,791
Smelt	200	10			834,500	25,920
Steelhead trout					2,000	300
Sturgeon			1,000	250	28,900	9,454
Sucker "mullet"	221,900	7,608	185,300	2,335	5,855,400	201,384
Sunfish					41,400	1,024
Tullibees			131,600	701	131,600	701
White bass					739,300	43,513
Whitefish:						
Common	512,300	100,321	110,100	11,809	5,249,700	973,984
Menominee	45,900	3,140			246,600	18,407
Yellow perch	1,100	70	82,400	3,411	11,931,700	737,042
Yellow pike	19,400	2,451	1,099,100	95,119	4,593,000	535,442
Crawfish					39,509	3,556
Mussel shells [1]					687,100	12,170
Pearls and slugs [1]						183
Total	17,873,500	940,608	2,457,100	139,664	90,222,600	5,944,943

[1] From tributary streams.

FISHERIES OF THE MISSISSIPPI RIVER AND TRIBUTARIES [12]

The most recent complete catch statistics of the fisheries for the States of the Mississippi River and tributaries are those collected for the year 1931. The yield of fishery products in that year amounted to 82,382,523 pounds, valued at $2,897,357, which was a decrease of 22 percent in quantity and 36 percent in value as compared with the quantity and value of the catch in 1922 when the most recent preceding survey was made. Detailed statistics of the fisheries of the Mississippi River and tributaries for 1931 appear in "Fishery Industries of the United States, 1932" by R. H. Fiedler, appendix III to the Report of the Commissioner of Fisheries for the fiscal year 1933. A summary of these fisheries in 1931, as well as certain data for 1936, appear in the following tables.

[12] For a clearer understanding of the statistics published in this section, the reader is referred to the section in the latter part of the document entitled "Statistical survey procedure."

Fisheries of the Mississippi River and tributaries, 1931

OPERATING UNITS: By States

Item	Alabama	Arkansas	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Minnesota
Fishermen:									
On boats and shore:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Regular	104	1,463	708	20	245	35	89	1,402	160
Casual	131	1,524	1,318	1,735	648	88	440	3,108	578
Total	235	2,987	2,026	1,755	893	123	529	4,510	738
Boats:									
Motor	32	907	676	544	309	18	92	1,225	65
Other	190	2,359	957	1,189	457	123	420	2,369	446
Apparatus:									
Haul seines		16	127	50	133		24	377	113
Length, yards		7,308	33,975	5,170	36,339		2,057	85,166	49,968
Anchor gill nets		4						74	9
Square yards		2,800						17,400	9,999
Trammel nets		31	28	3		90		78	
Square yards		3,899	4,890	360		9,026		19,696	
Lines, trot	449	5,327	1,312	320	1,158	17	627	5,757	186
Hooks	35,980	455,000	124,715	16,767	186,250	360	37,395	1,392,200	41,800
Pound nets					2				27
Fyke nets	610	5,346	9,852	335	1,981	189	1,231	5,908	74
Dip nets			22		10			159	
Traps:									
Crawfish								18	
Shrimp								88	
Baskets			3,769						
Mussel dredges		426	14						
Yards at mouth		286	10						
Crowfoot bars	168	1,038	840	1,092	464		256	10	192
Tongs		159		72				5	
Rakes		70							
Forks		102	33	1,278		29		5	
Grabs								2,232	

Item	Mississippi	Missouri	Nebraska	Ohio	Oklahoma	South Dakota	Tennessee	Texas	Wisconsin	Total
Fishermen:										
On boats and shore:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Regular	211	177			5		327	5	202	5,153
Casual	198	170	299	49	19	67	206	41	112	10,731
Total	409	347	299	49	24	67	533	46	314	15,884
Boats:										
Motor	138	84	30			2	138	6	160	4,426
Other	329	304	187	49	18	34	467	42	180	10,120
Apparatus:										
Haul seines	16	47	12	2	2	11			83	1,013
Length, yards	6,885	5,668	906	180	60	1,948			20,149	255,779
Anchor gill nets	4	1			3				6	101
Square yards	800	160			990				13,488	45,637
Trammel nets	17	104	115				52			518
Square yards	2,867	14,668	4,833				3,560			63,799
Lines:										
Hand							67			67
Hooks							67			67
Trot	847	516		19	29	18	464	80	3	17,129
Hooks	72,155	34,600		900	1,075	3,600	41,690	14,500	125	2,459,112
Pound nets									345	374
Fyke nets	2,591	1,872	296	76	85	68	1,735	70	222	32,541
Dip nets										191
Traps:										
Crawfish										18
Shrimp	350									438
Baskets										3,769
Spears							12			12
Mussel dredges										440
Yards at mouth										296
Crowfoot bars							230		190	4,480
Tongs		9								245
Rakes										70
Forks										1,447
Grabs										2,232

Fisheries of the Mississippi River and tributaries, 1931—Continued

CATCH: BY STATES

Species	Alabama		Arkansas		Illinois		Indiana	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin			700	$28	8,308	$241		
Buffalofish	21,330	$2,342	2,182,446	131,474	911,609	51,893	85,045	$8,156
Carp	11,000	1,118	808,206	27,268	4,878,744	128,221	157,641	10,162
Catfish and bullheads	81,200	8,850	1,077,343	93,150	647,696	68,890	35,370	5,302
Crappie	9,772	1,004	11,325	227				
Eels					4,985	322		
Mooneye					1,000	20		
Paddlefish or spoonbill cat	3,958	338	93,200	2,159	104,846	5,480	16,492	1,724
Quillback or "American carp"	7,657	875	6,830	676	17,532	608	30,312	1,436
Sheepshead	45,909	4,972	676,358	29,877	177,709	11,321	38,740	3,711
Sturgeon, shovelnose	575	70			39,766	3,448	3,013	292
Sucker "mullet"	5,752	609	3,309	235	25,130	1,087	16,797	1,156
White bass					1,200	92		
Yellow pike							4,550	693
Total	187,153	20,178	4,859,717	285,094	6,818,525	271,623	387,960	32,632
SHELLFISH, ETC.								
Mussel shells	1,635,000	10,132	10,872,790	108,819	7,429,528	82,894	7,328,736	105,632
Pearls				3,137		190		125
Slugs		2,444		14,401		11,835		18,788
Turtles:								
Snapper					14,577	696	500	25
Soft shell							400	20
Total	1,635,000	12,576	10,872,790	126,357	7,444,105	95,615	7,329,636	124,590
Grand total	1,822,153	32,754	15,732,507	411,451	14,262,630	367,238	7,717,596	157,222

Species	Iowa		Kansas		Kentucky		Louisiana [1]	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin	91,825	$3,759					5,715	$114
Buffalofish	746,615	59,705	24,325	$2,222	164,558	$14,429	8,784,314	263,261
Carp	1,594,244	80,134	117,489	10,956	113,461	8,124	204,743	4,127
Catfish and bullheads	467,340	48,593	770	111	131,777	17,043	6,602,987	528,579
Eels	325	15					200	6
Garfish							72,450	791
Mooneye	1,100	28			990	105		
Paddlefish or spoonbill cat	9,400	638			18,322	1,617	495,544	21,508
Pike or pickerel	4,700	470						
Quillback or "American carp"	60,450	1,339	100	11	11,355	984	20,700	431
Sauger					2,365	451		
Sheepshead	343,449	17,619			52,560	6,762	1,976,600	39,577
Sturgeon, shovelnose	17,650	1,663	175	24	2,967	380		
Sucker "mullet"	36,550	822			10,294	1,331		
Yellow pike					70	18		
Total	3,373,648	214,785	142,859	13,324	508,719	51,244	18,163,253	858,394
SHELLFISH, ETC.								
Crawfish							29,248	292
Shrimp							38,503	2,423
Mussel shells	4,366,219	65,685	312,562	2,713	1,113,032	8,786	50,000	375
Pearls		7,244						
Slugs		13,924		636		852		
Frogs							872,651	130,612
Terrapin	19,100	377						
Turtles:								
Snapper	2,060	40					58,013	2,244
Soft shell	17,000	340					1,700	34
Total	4,404,319	87,610	312,562	3,349	1,113,032	9,638	1,050,115	135,980
Grand total	7,777,967	302,395	455,421	16,673	1,621,751	60,882	19,213,368	994,374

[1] According to statistics furnished by the Louisiana Department of Conservation, the catch of commercial fresh-water fish in Louisiana during 1936 was as follows: Catfish, 4,364,000 pounds, valued at $405,000; gaspergou, 1,750,000 pounds, valued at $105,000; spoonbill cat, 750,000 pounds, valued at $60,000; buffalofish, 10,000,000 pounds, valued at $600,000; fresh-water turtles, 76,500 pounds, valued at $11,475; frogs, 2,750,000 pounds, valued at $650,000; fresh-water shrimp, 2,500,000 pounds, valued at $200,000; crayfish, 2,500,000 pounds, valued at $175,000; terrapin, 30,660 in number, valued at $30,000; and "baby" green turtles, 5,200,000 in number, valued at $52,000.

Fisheries of the Mississippi River and tributaries, 1931—Continued

CATCH: BY STATES—Continued

Species	Minnesota		Mississippi		Missouri		Nebraska	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin	16,598	$282			17,000	$520		
Buffalofish	257,431	15,092	1,511,126	$63,824	178,991	16,414	18,104	$1,813
Carp	2,151,119	97,756	225,276	6,730	433,117	33,356	93,032	9,305
Catfish and bullheads	53,804	4,841	635,049	42,384	91,430	15,487	34,174	5,135
Eels			250	20	1,055	53		
Minnows					525	209		
Paddlefish or "spoonbill cat"			158,821	5,879	40,103	2,917		
Quillback or "American carp"	17,246	519	2,157	42	13,672	946		
Sheepshead	152,545	7,938	106,844	2,576	38,186	3,773		
Sturgeon, shovelnose	1,634	115	100	3	17,282	1,703		
Sucker "mullet"	65,273	1,955			2,275	292		
Total	2,715,650	128,498	2,639,623	121,458	833,636	75,670	145,310	16,253
SHELLFISH, ETC.								
Shrimp			10,000	1,500				
Mussel shells	782,630	7,827			94,000	1,193		
Pearls		157						
Slugs		1,174				118		
Turtles, snapper			100	3				
Total	782,630	9,158	10,100	1,503	94,000	1,311		
Grand total	3,498,280	137,656	2,649,723	122,961	927,636	76,981	145,310	16,253

Species	Ohio		Oklahoma		South Dakota		Tennessee [2]	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Black bass							14,000	$1,680
Buffalofish	6,433	$662	21,605	$2,142	38,926	$3,894	478,592	34,247
Carp	14,370	1,543	4,268	425	52,836	2,642	247,841	9,597
Catfish and bullheads	4,380	811	4,935	695	13,500	3,528	271,753	24,750
Crappie					1,392	70	18,652	1,658
Eels							163	25
Paddlefish or "spoonbill cat"			5,332	533	400	40	5,034	301
Quillback or "American carp"	1,195	119	1,950	195	4,364	220	6,065	843
Sheepshead	1,318	224	1,550	155	697	70	197,670	10,465
Sturgeon, shovelnose	558	72					3,706	393
Sucker "mullet"	2,902	268			2,246	112	8,323	1,119
Sunfish							21,850	1,094
White bass							2,100	106
Yellow pike	325	60						
Total	31,481	3,759	39,640	4,145	114,361	10,576	1,275,749	86,275
SHELLFISH, ETC.								
Mussel shells	154,000	3,005					2,157,000	15,604
Pearls								28
Slugs		308						1,724
Frogs							2,250	270
Terrapin							70	14
Total	154,000	3,313					2,159,320	17,640
Grand total	185,481	7,072	39,640	4,145	114,361	10,576	3,435,069	103,915

[2] According to statistics furnished the Bureau by the office of fish technician, division of game and fish, Tennessee Department of Conservation, the catch of commercial fresh-water fish in Reelfoot Lake in Tennessee during the fiscal year May 1, 1935, to Apr. 30, 1936, was as follows: Bass, 9,237 pounds; crappie, 62,478 pounds; sunfish, 55,710 pounds; yellow bass, 12,392 pounds; buffalofish, 244,169 pounds; drum, 32,832 pounds; carp, 25,150 pounds; bullheads, 24,408 pounds; catfish, 90,203 pounds; eels, 574 pounds; spoonbill cat, 1,174 pounds; white bass, 275 pounds; and pike, 72 pounds.

Fisheries of the Mississippi River and tributaries, 1931—Continued

CATCH: BY STATES—Continued

Species	Texas		Wisconsin		Total	
FISH	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Black bass					14,000	$1,680
Bowfin			288,170	$4,355	428,316	9,299
Buffalofish	73,000	$2,190	268,001	13,528	15,772,451	687,288
Carp	6,900	138	777,474	23,800	11,891,761	455,399
Catfish and bullheads	47,800	3,824	65,539	5,825	10,266,847	877,798
Crappie					41,141	2,959
Eels					6,978	441
Garfish					72,450	791
Minnows					525	209
Mooneye					3,090	153
Paddlefish or "spoonbill cat"					951,452	43,134
Pike or pickerel					4,700	470
Quillback or "American carp"	500	10	66,353	2,032	268,438	11,286
Sauger					2,365	451
Sheepshead	10,300	206	84,499	3,692	3,904,844	142,938
Sturgeon, shovelnose					87,426	8,163
Sucker "mullet"			135,984	3,696	314,835	12,682
Sunfish					21,850	1,094
White bass					3,300	198
Yellow pike					4,945	771
Total	138,500	6,368	1,685,930	56,928	44,061,714	2,257,204
SHELLFISH, ETC.						
Crawfish					29,248	292
Shrimp					48,503	3,923
Mussel shells			959,200	8,946	37,254,697	421,611
Pearls				555		11,436
Slugs				2,012		68,216
Frogs					874,901	130,882
Terrapin					19,170	391
Turtles:						
Snapper					75,190	3,008
Soft shell					19,100	394
Total			959,200	11,513	38,320,809	640,153
Grand total	138,500	6,368	2,645,130	68,441	82,382,523	2,897,357

Industries related to the fisheries of the Mississippi River and tributaries

OPERATING UNITS, SALARIES, AND WAGES, 1931

Item	Arkansas	Illinois	Indiana	Iowa	Kentucky	Louisiana	Minnesota and North Dakota
Transporting:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Persons engaged	13				11	5	
Vessels, motor	4				2	2	
Net tonnage	69				15	20	
Wholesale and manufacturing:							
Establishments	6	38	4	61	11	22	13
Persons engaged:							
Proprietors	3	42	1	52	8	24	11
Salaried employees	9	3	5	79	20	14	27
Wage earners:							
Average for season	152	331	140	2,500	261	70	112
Average for year	72	235	93	2,179	159	68	112
Paid to salaried employees	$11,417	$9,520	$6,820	$141,346	$33,159	$12,400	$55,200
Paid to wage earners	$53,503	$145,683	$51,444	$1,417,678	$81,643	$37,700	$81,500
Total salaries and wages	$64,920	$155,203	$58,264	$1,559,024	$114,802	$50,100	$136,700
Fishermen manufacturing		4	2			200	

Industries related to the fisheries of the Mississippi River and tributaries—Contd.

OPERATING UNITS, SALARIES, AND WAGES, 1931—Continued

Item	Mississippi	Missouri and Oklahoma	Nebraska and Kansas	Ohio and Pennsylvania	Tennessee	Wisconsin	Total
Transporting:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Persons engaged							29
Vessels, motor							8
Net tonnage							104
Wholesale and manufacturing:							
Establishments	6	21	3	13	11	8	217
Persons engaged:							
Proprietors	7	24	3	17	9	3	204
Salaried employees	3	125	8	37	15	10	355
Wage earners:							
Average for season	26	328	52	175	90	38	4,275
Average for year	26	261	52	145	52	29	3,483
Paid to salaried employees	$16,000	$291,874	$17,400	$95,878	$34,884	$12,998	$738,896
Paid to wage earners	$22,382	$202,944	$45,580	$138,817	$38,177	$24,483	$2,341,534
Total salaries and wages	$38,382	$494,818	$62,980	$234,695	$73,061	$37,481	$3,080,430
Fishermen manufacturing	7	3					216

PRODUCTS MANUFACTURED

Item	Indiana		Iowa, Illinois, and Missouri		Louisiana	
By manufacturing establishments:	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Salmon, smoked—pounds			240,000	$48,800		
Sturgeon, smoked—do			162,000	39,140		
Mussel-shell products:						
Buttons [1]—gross			14,591,680	3,666,873		
Poultry feed [1]—tons			4,701	25,534		
Lime [1]—do			1,956	1,726		
Unclassified—pounds				[2] 75,849		
Total				3,857,922		
By fishermen:						
Alligator hides—pounds					88,356	$7,363
Carp, smoked—do			667	67		
Paddlefish roe, salted—do	450	$180	900	540		
Sheepshead, smoked—do			617	77		
Sturgeon:						
Smoked—do			1,333	400		
Roe, salted—do			35	32		
Total	450	180	3,552	1,116	88,356	7,363
Grand total	450	180		3,859,038	88,356	7,363

Item	Minnesota and Nebraska		Mississippi		Ohio, Tennessee, and Pennsylvania	
By manufacturing establishments:	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Chubs, smoked—pounds					106,600	$26,650
Salmon, smoked—do	[3]	[3]			[3]	[3]
Sturgeon, smoked—do	[3]	[3]				
Whitefish, smoked—do	255,000	$47,200				
Unclassified—do	[4] 66,600	[4] 19,793			[5] 184,900	[5] 50,555
Total	321,600	66,993			291,500	77,205
By fishermen, paddlefish roe, salted			245	$92		
Grand total	321,600	66,993	245	92	291,500	77,205

[1] Data are for 1936.
[2] Data are for 1931 and 1936. Includes smoked buffalofish and tullibees, and mussel-shell chips and novelties.
[3] The production of this item is included under unclassified products.
[4] Includes smoked eels, salmon, and sturgeon.
[5] Includes smoked buffalofish, butterfish, carp, lake trout, paddlefish, sablefish, salmon, tullibees, and whitefish.

NOTE.—Unless otherwise indicated the data are for 1931. The total value of the manufactured products for the States of the Mississippi River and tributaries was as follows: By manufacturing establishments, $4,002,120; and by fishermen, $8,751. Some of the products may have been manufactured from fishery products imported from another State or a foreign country; therefore, they cannot be correlated directly with the catch within the State.

LAKE PEPIN

Fisheries of Lake Pepin, 1936

OPERATING UNITS: BY GEAR

Item	Haul seines	Anchor gill nets	Trot lines	Total, exclusive of duplication
	Number	*Number*	*Number*	*Number*
Fishermen:				
Regular	18	24		24
Casual	30	44	18	75
Total	48	68	18	99
Boats:				
Motor	15	38	14	49
Other	15	9	4	23
Apparatus:				
Number	15	68	18	
Length, yards	6,465			
Square yards		189,553		
Hooks			590	

CATCH: BY GEAR

Species	Haul seines		Anchor gill nets		Trot lines		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin	3,500	$105	500	$15			4,000	$120
Buffalofish	10,500	525	13,100	655			23,600	1,180
Carp	260,000	7,800	221,000	6,630	7,600	$228	488,600	14,658
Catfish and bullheads	13,900	1,390	1,600	160	17,100	1,710	32,600	3,260
Mooneye	2,700	54	200	4			2,900	58
Sheepshead	27,600	1,380	6,000	300	5,300	265	38,900	1,945
Sucker "mullet"	2,500	50	500	10			3,000	60
Turtles:								
Snapper	3,200	64					3,200	64
Soft shell	3,500	70					3,500	70
Total	327,400	11,438	242,900	7,774	30,000	2,203	600,300	21,415

OPERATING UNITS: BY STATES

Item	Minnesota	Wisconsin	Total for lake
	Number	*Number*	*Number*
Fishermen:			
Regular		24	24
Casual	14	61	75
Total	14	85	99
Boats:			
Motor	10	39	49
Other	4	19	23
Apparatus:			
Haul seines		15	15
Length, yards		6,465	6,465
Anchor gill nets		68	68
Square yards		189,553	189,553
Trot lines	14	4	18
Hooks	490	100	590

Fisheries of Lake Pepin, 1936—Continued

CATCH: BY STATES

Species	Minnesota		Wisconsin		Total for lake	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin			4,000	$120	4,000	$120
Buffalofish			23,600	1,180	23,600	1,180
Carp	7,100	$213	481,500	14,445	488,600	14,658
Catfish and bullheads	15,100	1,510	17,500	1,750	32,600	3,260
Mooneye			2,900	58	2,900	58
Sheepshead	4,800	240	34,100	1,705	38,900	1,945
Sucker "mullet"			3,000	60	3,000	60
Turtles:						
Snapper			3,200	64	3,200	64
Soft shell			3,500	70	3,500	70
Total	27,000	1,963	573,300	19,452	600,300	21,415

LAKE KEOKUK

Fisheries of Lake Keokuk, 1936

OPERATING UNITS: BY GEAR

Item	Haul seines	Trammel nets	Trot lines	Fyke nets	Total, exclusive of duplication
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*
Regular	12	16	16	50	65
Casual	18	11	73	89	113
Total	30	27	89	139	178
Boats:					
Motor	8	27	56	99	110
Other	8		27	47	64
Apparatus:					
Number	8	27	264	2,085	
Length, yards	1,633				
Square yards		3,609			
Hooks			24,750		

CATCH: BY GEAR

Species	Haul seines		Trammel nets		Trot lines		Fyke nets		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin	2,000	$60					1,200	$36	3,200	$96
Buffalofish	38,000	1,900	11,500	$575			81,500	4,075	131,000	6,550
Carp	188,700	5,661	60,000	1,860	24,000	$730	207,500	6,365	480,200	14,616
Catfish and bullheads	17,600	1,760	1,900	190	48,000	4,800	117,300	11,730	184,800	18,480
Mooneye	500	15							500	15
Paddlefish or spoonbill cat	4,400	445							4,400	445
Sheepshead	36,200	1,810	17,000	850	8,500	425	65,700	3,285	127,400	6,370
Sucker "mullet"	2,800	56					3,200	64	6,000	120
Turtles:										
Snapper	6,500	130			800	16	3,600	72	10,900	218
Soft shell	1,100	22			100	2	1,200	24	2,400	48
Total	297,800	11,859	90,400	3,475	81,400	5,973	481,200	25,651	950,800	46,958

Fisheries of Lake Keokuk, 1936—Continued

OPERATING UNITS: BY STATES

Item	Illinois	Iowa	Total for lake
Fishermen:	*Number*	*Number*	*Number*
Regular	36	29	65
Casual	64	49	113
Total	100	78	178
Boats:			
Motor	68	42	110
Other	28	36	64
Apparatus:			
Haul seines	1	7	8
Length, yards	333	1,300	1,633
Trammel nets	21	6	27
Square yards	2,866	743	3,609
Trot lines	242	22	264
Hooks	24,200	550	24,750
Fyke nets	1,455	630	2,085

CATCH: BY STATES

Species	Illinois		Iowa		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin	1,500	$45	1,700	$51	3,200	$96
Buffalofish	44,000	2,200	87,000	4,350	131,000	6,550
Carp	176,700	5,371	303,500	9,245	480,200	14,616
Catfish and bullheads	113,600	11,360	71,200	7,120	184,800	18,480
Mooneye	500	15			500	15
Paddlefish or spoonbill cat	3,000	300	1,400	145	4,400	445
Sheepshead	68,900	3,445	58,500	2,925	127,400	6,370
Sucker "mullet"	4,000	80	2,000	40	6,000	120
Turtles:						
Snapper	3,700	74	7,200	144	10,900	218
Soft shell	900	18	1,500	30	2,400	48
Total	416,800	22,908	534,000	24,050	950,800	46,958

MISSISSIPPI RIVER BETWEEN LAKE PEPIN AND LAKE KEOKUK

Fisheries of the Mississippi River between Lake Pepin and Lake Keokuk, 1936

OPERATING UNITS: BY GEAR

Item	Haul seines	Anchor gill nets	Trammel nets	Trot lines	Fyke nets	Total, exclusive of duplication
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Regular	164	8	29	22	233	389
Casual	256	7	25	416	371	628
Total	420	15	54	438	604	1,017
Boats:						
Motor	120	14	43	257	394	548
Other	120			162	164	366
Apparatus:						
Number	109	14	41	622	10,490	
Length, yards	19,174					
Square yards		25,641	5,333			
Hooks				45,635		

Fisheries of the Mississippi River between Lake Pepin and Lake Keokuk, 1936—Con.

CATCH: BY GEAR

Species	Haul seines		Anchor gill nets		Trammel nets	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin	92,000	$2,755	500	$15		
Buffalofish	596,700	29,815	27,500	1,375	64,000	$3,170
Carp	1,932,000	57,710	81,000	2,430	130,500	4,075
Catfish and bullheads	94,500	9,450	2,300	230	7,000	700
Eels	600	60				
Mooneye	48,700	848				
Paddlefish or spoonbill cat	4,700	470				
Pike or pickerel	37,300	3,605			1,000	100
Sheepshead	312,100	15,555	10,000	500	15,000	775
Sturgeon, shovelnose	7,300	725			10,900	1,090
Sucker "mullet"	72,100	1,442	700	14	1,100	22
Turtles:						
Snapper	34,500	690				
Soft shell	19,300	386				
Total	3,251,800	123,511	122,000	4,564	229,500	9,932

Species	Trot lines		Fyke nets		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin			25,900	$778	118,400	$3,548
Buffalofish			495,300	25,765	1,183,500	60,125
Carp	93,200	$2,816	1,146,700	35,901	3,383,400	102,932
Catfish and bullheads	188,700	18,770	712,300	71,230	1,004,800	100,380
Eels	1,400	140	200	20	2,200	220
Mooneye			2,100	42	50,800	890
Paddlefish or spoonbill cat					4,700	470
Pike or pickerel			1,200	120	39,500	3,825
Sheepshead	43,900	2,185	260,200	13,010	641,200	32,025
Sturgeon, shovelnose	1,800	180			20,000	1,995
Sucker "mullet"			38,700	772	112,600	2,250
Turtles:						
Snapper			10,400	208	44,900	898
Soft shell			4,600	92	23,900	478
Total	329,000	24,091	2,697,600	147,938	6,629,900	310,036

OPERATING UNITS: BY STATES

Item	Illinois	Iowa	Minnesota	Wisconsin	Total
Fishermen:	*Number*	*Number*	*Number*	*Number*	*Number*
Regular	94	171	8	116	389
Casual	192	229	47	160	628
Total	286	400	55	276	1,017
Boats:					
Motor	163	224	26	135	548
Other	113	133	22	98	366
Apparatus:					
Haul seines	23	32	6	48	109
Length, yards	4,350	5,132	1,064	8,628	19,174
Anchor gill nets			1	13	14
Square yards			2,666	22,975	25,641
Trammel nets	12	29			41
Square yards	1,633	3,700			5,333
Trot lines	343	141	39	99	622
Hooks	34,300	4,450	1,245	5,640	45,635
Fyke nets	3,215	4,885		2,390	10,490

Fisheries of the Mississippi River between Lake Pepin and Lake Keokuk, 1936—Con.

CATCH: BY STATES

Species	Illinois		Iowa		Minnesota		Wisconsin		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Bowfin	8,500	$250	52,100	$1,524	7,500	$225	50,300	$1,549	118,400	$3,548
Buffalofish	334,700	16,735	491,100	24,525	33,500	1,655	324,200	17,210	1,183,500	60,125
Carp	623,200	18,816	1,335,900	41,387	157,300	4,719	1,267,000	38,010	3,383,400	102,932
Catfish and bullheads	237,700	23,670	478,800	47,880	49,500	4,950	238,800	23,880	1,004,800	100,380
Eels	900	90	1,300	130					2,200	220
Mooneye	11,500	230	15,300	306			24,000	354	50,800	890
Paddlefish or spoonbill cat	2,100	210	800	80			1,800	180	4,700	470
Pike or pickerel			39,500	3,825					39,500	3,825
Sheepshead	167,800	8,490	241,600	12,005	25,600	1,220	206,200	10,310	641,200	32,025
Sturgeon, shovelnose	1,000	100	19,000	1,895					20,000	1,995
Sucker "mullet"	15,700	312	42,400	848	5,000	100	49,500	990	112,600	2,250
Turtles:										
Snapper	4,700	94	28,200	564	3,300	66	8,700	174	44,900	898
Soft shell	4,000	80	7,900	158	4,300	86	7,700	154	23,900	478
Total	1,411,800	69,077	2,753,900	135,127	286,000	13,021	2,178,200	92,811	6,629,900	310,036

FISHERIES OF ALASKA [13]

The commercial catch of fishery products in Alaska during 1936, exclusive of whales, amounted to 923,528,817 pounds, valued at $13,891,412, which is an increase of 45 percent in quantity and 60 percent in value as compared with the catch in 1935. Of the total catch in 1936, 726,853,292 pounds, valued at $11,856,541, consisted of salmon; 194,125,352 pounds, valued at $1,882,603, other fish; and 2,550,173 pounds, value at $152,268, shellfish. In addition, 385 whales were taken. These fisheries gave employment to 11,722 fishermen, 2,064 persons on transporting craft, and 16,597 persons in fishery wholesale and manufacturing industries—a total of 30,383 persons, which is an increase of 34 percent as compared with the number employed in 1935.

[13] Statistics for the fisheries of Alaska are collected and compiled by the Alaska Division of this Bureau. A summary of these statistics appears in this section. For detailed figures the reader is referred to "Alaska Fishery and Fur-Seal Industries in 1936," by Ward T. Bower, appendix II to the Report of Commissioner of Fisheries for the fiscal year 1937.

Fisheries of Alaska, 1936

SUMMARY: BY DISTRICTS

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
PERSONS ENGAGED	*Number*	*Value*	*Number*	*Value*	*Number*	*Value*	*Number*	*Value*
In fishing	5,937		2,824		3,501		11,722	
In transporting	880		722		462		2,064	
In wholesale and manufacturing industries	7,153		5,118		4,326		16,597	
Total	13,430		8,664		8,289		30,383	
CRAFT EMPLOYED								
Vessels fishing	785		105		10		900	
Boats fishing	2,314		1,471		1,484		5,269	
Vessels transporting	197		151		90		438	
Scows, houseboats, pile drivers, etc	308		254		214		776	
Total	3,604		1,981		1,798		7,383	
CATCH	*Pounds*		*Pounds*		*Pounds*		*Pounds*	
Fish:								
Salmon	328,973,002	$4,840,414	248,541,961	$3,902,154	149,338,329	$3,113,973	726,853,292	$11,856,541
Other	89,201,206	1,356,760	101,105,863	506,752	3,818,283	19,091	194,125,352	1,882,603
Shellfish	1,299,069	68,743	1,251,104	83,525			2,550,173	152,268
Total	419,473,277	6,265,917	350,898,928	4,492,431	153,156,612	3,133,064	923,528,817	13,981,412
	Number		*Number*		*Number*		*Number*	
Whales			188		197		385	
WHOLESALE AND MANUFACTURING								
Establishments	104		101		44		249	
PRODUCTS AS PREPARED FOR MARKET	*Pounds*		*Pounds*		*Pounds*		*Pounds*	
Salmon	212,371,475	18,982,017	138,432,480	15,302,544	73,677,205	12,211,661	424,481,160	46,496,222
Herring	28,918,206	689,485	42,711,664	1,264,806	2,558,250	121,341	74,188,120	2,075,632
Halibut	13,719,340	958,304					13,719,340	958,304
Cod			249,331	11,881			249,331	11,881
Trout	42,683	3,400	3,680	436			46,363	3,836
Sablefish	789,266	50,448					789,266	50,448
Rockfishes	21,532	814					21,532	814
"Lingcod"	1,421	639					1,421	639
Clams			390,132	201,887			390,132	201,887
Shrimp	478,749	162,274					478,749	162,274
Crabs	235,095	72,577	238,150	86,297			473,245	158,874

Whale			3,724,000	146,198	5,089,875	188,263	8,813,875	334,461
Total	256,577,767	20,919,958	185,749,437	17,014,049	81,325,330	12,521,265	523,652,534	50,455,272

OPERATING UNITS: By districts

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
	Number	*Number*	*Number*	*Number*
Fishermen	5,397	2,824	3,501	11,722
Vessels fishing:				
Steam		3	4	7
Net tonnage		207	340	547
Motor	785	102	6	893
Net tonnage	9,780	2,205	123	12,108
Boats fishing:				
Motor	931	338	49	1,318
Other	1,383	1,133	1,435	3,951
Apparatus:				
Traps	284	169		453
Purse seines	582	217	4	803
Yards	202,630	55,016	2,000	259,646
Haul seines	6	211		217
Yards	1,200	39,058		40,258

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
Apparatus—Continued.	*Number*	*Number*	*Number*	*Number*
Gill nets	359	1,522	2,363	4,244
Yards	52,660	171,380	371,648	595,688
Beam trawls	12			12
Wheels			297	297
Lines:				
Hand lines (cod fishery)		28		28
Trawl lines (cod fishery)		3		3
Troll lines (salmon fishery)	3,580			3,580
Skates of lines (halibut fishery)	2,358			2,358
Crab pots	2,574	780		3,354
Herring pounds	5	2		7
Herring pound seines	8	1		9

CATCH: By districts

[Estimated round weight and value to fishermen]

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
FISH								
Salmon:	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Blueback, red or sockeye	16,823,779	$486,900	76,240,108	$1,854,458	133,901,304	$3,024,343	226,965,191	$5,365,701
Chinook or king	13,621,260	334,977	2,226,800	59,255	2,033,780	14,581	17,881,840	408,813
Chum or keta	68,453,064	724,060	29,696,301	265,148	10,405,377	38,734	108,554,742	1,027,942
Humpback or pink	215,676,395	2,983,686	133,165,920	1,579,351	2,416,212	31,572	351,258,527	4,594,609
Silver or coho	14,398,504	310,791	7,212,832	143,942	581,656	4,743	22,192,992	459,476
Herring	68,630,959	343,155	100,379,252	501,896	3,818,283	19,091	172,828,494	864,142
Halibut [1]	19,380,486	958,304					19,380,486	958,304
Cod			722,011	4,420			722,011	4,420

[1] Heretofore it was estimated that the shrinkage between the round weight of halibut and the eviscerated, heads-off weight, on which fishermen were paid, was 10 percent, but upon investigation it has been ascertained that the average shrinkage is 30 percent. The latter rate has been used, therefore, in determining the round weight of the halibut taken during 1936.

Fisheries of Alaska, 1936—Continued

CATCH: BY DISTRICTS—Continued

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
FISH—continued								
Trout:	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
Dolly Varden	11,612	$848	4,600	$436			16,212	$1,284
Steelhead	41,741	2,552					41,741	2,552
Sablefish	1,101,861	50,448					1,101,861	50,448
Rockfishes	33,126	814					33,126	814
"Lingcod" (livers) [2]	1,421	639					1,421	639
Total	418,174,208	6,197,174	349,647,824	4,408,906	153,156,612	$3,133,064	920,978,644	13,739,144
SHELLFISH								
Crabs:								
Dungeness	431,580	36,166	470,840	43,148			902,420	79,314
King	1,680	122					1,680	122
Shrimp	865,809	32,455					865,809	32,455
Clams, razor			780,264	40,377			780,264	40,377
Total	1,299,069	68,743	1,251,104	83,525			2,550,173	152,268
Grand total	419,473,277	6,265,917	350,898,928	4,492,431	153,156,612	3,133,064	923,528,817	13,891,412

[2] Catch of "lingcod" other than livers was landed at Seattle, Wash.

NOTE.—In addition to the above statistics, 385 whales were taken in Alaska waters. The round weight and value to fishermen cannot be determined, but the products amounted to 8,813,875 pounds, valued at $334,461.

Industries related to the fisheries of Alaska, 1936

TRANSPORTING

Item	Southeast Alaska	Central Alaska	Western Alaska	Total	Item	Southeast Alaska	Central Alaska	Western Alaska	Total
	Number	*Number*	*Number*	*Number*	Vessels transporting—Continued.	*Number*	*Number*	*Number*	*Number*
Persons engaged	880	722	462	2,064	Motor	197	150	82	429
Vessels transporting:					Net tonnage	5,658	5,204	2,606	13,468
Steam		1	8	9	Scows, houseboats, pile drivers, etc	308	254	214	776
Net tonnage		3,758	17,793	21,551					

WHOLESALE AND MANUFACTURING

Item	Southeast Alaska	Central Alaska	Western Alaska	Total
	Number	*Number*	*Number*	*Number*
Persons engaged	7,153	5,118	4,326	16,597
Establishments:				
Handling fresh and frozen fish	54	4		58
Curing fish	40	58	23	121
Canning fish	52	55	24	131
Manufacturing byproducts	6	11	1	18
Total (exclusive of duplication)	104	101	44	249

PRODUCTS AS PREPARED FOR MARKET

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
FRESH								
Salmon (for food)	4,690,507	$369,442					4,690,507	$369,442
Salmon (for fox feed)			44,980	$430			44,980	430
Herring (for bait)	2,649,400	29,201	4,700	59			2,654,100	29,260
Halibut	6,957,336	443,762					6,957,336	443,762
Halibut livers	153,000	68,850					153,000	68,850
Trout	1,847	178	3,680	436			5,527	614
Sablefish livers	40,000	18,000					40,000	18,000
"Lingcod" livers	1,421	639					1,421	639
Crabs:								
Meat	61,452	23,706	29,110	8,051			90,562	31,757
Whole in shell	36,930	1,887	5,460	305			42,390	2,192
Shrimp:								
Meat	467,407	159,420					467,407	159,420
Whole in shell	5,676	728					5,676	728
Total	15,064,976	1,115,813	87,930	9,281			15,152,906	1,125,094
FROZEN								
Salmon (for food)	5,574,914	374,330					5,574,914	374,330
Salmon (for bait)	439,238	4,535					439,238	4,535
Herring (for bait)	3,057,805	21,940					3,057,805	21,940
Halibut	6,609,004	445,692					6,609,004	445,692
Trout	40,836	3,222					40,836	3,222
Sablefish	614,536	27,431					614,536	27,431
Rockfishes	21,532	814					21,532	814
Shrimp	5,666	2,126					5,666	2,126
Total	16,363,531	880,090					16,363,531	880,090

Industries related to the fisheries of Alaska, 1936—Continued

PRODUCTS AS PREPARED FOR MARKET—Continued

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Pounds	*Value*	*Pounds*	*Value*	*Pounds*	*Value*	*Pounds*	*Value*
CURED								
Salmon:								
Mild cured	4,289,600	$774,364			193,600	$24,200	4,483,200	$798,564
Pickled	104,300	8,570	314,450	$32,529	454,165	55,411	872,915	96,510
Dried and dry salted	20,500	3,075			1,451,600	58,640	1,472,100	61,715
Herring:								
Pickled (for bait)	586,200	6,000						
Pickled (for food):							586,200	6,000
Scotch cure	759,250	36,374	8,162,525	392,093	2,491,450	109,744	11,413,225	538,211
Norwegian cure			2,125	92			2,125	92
Roused					66,800	11,597	66,800	11,597
Spiced	1,500	125					1,500	125
Cod:								
Dry salted			158,607	7,711			158,607	7,711
Pickled			80,769	2,821			80,769	2,821
Stockfish			9,355	1,304			9,355	1,304
Tongues			600	45			600	45
Sablefish, pickled	134,730	5,017					134,730	5,017
Total	5,896,080	833,525	8,728,431	436,595	4,657,615	259,592	19,282,126	1,529,712
CANNED								
Salmon:								
Blueback, red, or sockeye	10,464,336	1,906,414	41,127,792	7,256,658	68,529,888	11,812,802	120,122,016	20,975,874
Chinook or king	984,240	154,486	1,299,504	228,550	206,688	29,508	2,490,432	412,544
Chum or keta	37,360,272	2,802,779	14,217,024	1,038,869	1,274,688	97,245	52,851,984	3,938,893
Humpback or pink	140,406,912	11,667,495	76,972,032	6,187,456	1,491,168	123,303	218,870,112	17,978,254
Silver or coho	6,466,656	886,527	4,128,336	548,989	75,408	10,552	10,670,400	1,446,068
Fish pudding (salmon)			3,600	500			3,600	500
Clams			390,132	201,887			390,132	201,887
Crabs	136,713	46,984	203,580	77,941			340,293	124,925
Total	195,819,129	17,464,685	138,342,000	15,540,850	71,577,840	12,073,410	405,738,969	45,078,945
BYPRODUCTS								
Fertilizer:								
Salmon	1,300,000	20,000	254,000	4,579			1,554,000	24,579
Whale			1,000,000	15,804	1,368,000	22,080	2,368,000	37,884
Meal, herring	11,628,749	223,165	16,756,319	298,849			28,385,068	522,014
Oil:								
Salmon	270,000	10,000	70,762	3,984			340,762	13,984
Herring	10,235,302	372,680	17,785,995	573,713			28,021,297	946,393
Whale			2,396,625	119,831	2,599,125	129,956	4,995,750	249,787

Sperm			327,375	10,563	1,122,750	36,227	1,450,125	46,790
Total	23,434,051	625,845	33,591,076	1,027,323	5,089,875	188,263	67,115,002	1,841,431
Grand total	256,577,767	20,919,958	185,749,437	17,014,049	81,325,330	12,521,265	523,652,534	50,455,272

NOTE.—The output of fresh and frozen halibut includes all fares of the Alaska fleet, some of which were landed at other than Alaska ports. The amount of livers landed by the Alaska fleet was not reported, and the quantity shown herein is the estimated amount landed in Alaska. The total landings of halibut in Alaska in 1936, other than livers, amounted to 8,658,774 pounds, valued at $507,484 (including 4,000 pounds, valued at $240, landed by Canadian vessels).

Supplementary table showing the pack of canned products in "standard cases" [1]

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Cases	*Value*	*Cases*	*Value*	*Cases*	*Value*	*Cases*	*Value*
Salmon:								
Blueback, red, or sockeye	218,007	$1,906,414	856,829	$7,256,658	1,427,766	$11,812,802	2,502,542	$20,975,874
Chinook or king	20,505	154,456	27,073	228,550	4,306	29,508	51,884	412,544
Chum or keta	778,339	2,802,779	296,188	1,038,869	26,556	97,245	1,101,083	3,938,893
Humpback or pink	2,925,144	11,667,495	1,603,584	6,187,456	31,066	123,303	4,559,794	17,978,254
Silver or coho	134,722	886,527	86,007	548,989	1,571	10,552	222,300	1,446,068
Fish pudding (salmon)			75	500			75	500
Clams			26,009	201,887			26,009	201,887
Crabs	2,848	46,984	4,241	77,941			7,089	124,925
Total	4,079,565	17,464,685	2,900,006	15,540,850	1,491,205	12,073,410	8,470,776	45,078,945

[1] The pack of salmon, fish pudding, and crabs has been converted to "standard cases" of 48 1-pound cans, and clams to "standard cases" of 48 No. 1 5-ounce cans.

Supplementary table showing the output of byproducts in tons and gallons

Item	Southeast Alaska		Central Alaska		Western Alaska		Total	
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Quantity*	*Value*
Fertilizer:								
Salmon tons	650	$20,000	127	$4,579			777	$24,579
Whale do			500	15,804	684	$22,080	1,184	37,884
Meal, herring do	5,814	223,165	8,378	298,849			14,192	522,014
Oil:								
Salmon gallons	36,000	10,000	9,435	3,984			45,435	13,984
Herring do	1,364,707	372,680	2,371,466	573,713			3,736,173	946,393
Whale do			319,550	119,831	346,550	129,956	666,100	249,787
Sperm do			43,650	10,563	149,700	36,227	193,350	46,790
Total		625,845		1,027,323		188,263		1,841,431

STATISTICAL SURVEY PROCEDURE

In order that those who use the statistical data contained in this and previous reports of the Division of Fishery Industries may be informed as to the source of the figures and methods for their collection, it has been deemed advisable to outline, in considerable detail, the statistical survey procedure followed by the Division. This procedure has been developed over a period of years, and changes in method have been made at times where such changes have appeared to work toward general improvement. While the surveys in the several sections are not made in the same manner, owing to varying facilities and records in different States, an attempt has been made to make the data collected by various methods in the producing areas comparable with respect to the same year as well as over a period of years. Throughout the entire plan it has been the intention to coordinate State and Federal fishery statistical work so that there will be as little duplication of effort as possible. The procedure will be discussed under two main heads—"Sectional surveys" and "Local and special surveys."

SECTIONAL SURVEYS

Statistical surveys of the fisheries and fishery industries of the various sections of the United States occupy by far the greatest part of the time of the statistical personnel of the Division. It is in the course of these surveys that the statistical and marketing agents visit the individual fishing localities of the various States to collect statistics of the volume of the catch of fish and its value, employment in fishing, quantity of fishing gear, number and classification of fishing and transporting craft, employment in wholesale and manufacturing establishments, and the volume and value of manufactured fishery products and byproducts. The various phases of these surveys are discussed in detail in the sections following.

History.—The first comprehensive statistical survey of the fisheries and fishery industries of the United States was made for the year 1880 by George Brown Goode, Assistant Director of the U. S. National Museum, and associates, with the cooperation of the Commissioner of Fisheries and the Superintendent of the Tenth Census. Data for specific fisheries, or restricted sections for years prior to 1880, were also collected in this early survey and recorded in Mr. Goode's reports. The survey for 1880, however, did not include the Mississippi River and tributaries. Periodic general surveys of a limited number of States or limited areas of the United States were made for various of the intervening years between 1880 and 1908 and from 1909 to 1928. In 1908 a survey of the entire United States was made. The next general survey of the entire United States was not made until 1931, although complete data for all sections, excluding the Mississippi River and tributaries, were collected for 1929 and 1930. Complete data on the catch and operating units for all sections, excluding the Mississippi River and its tributaries, were collected for 1932. In the latter survey, however, lack of sufficient funds prohibited collection of data on wholesale and manufacturing firms except those data collected as a part of the canned fishery products and byproducts surveys. Complete general canvasses were made of the Chesapeake and Pacific States for the years from 1933 to 1936, inclu-

sive, the New England and Middle Atlantic States for 1933 and 1935, and the South Atlantic, Gulf, and Lake States for 1934 and 1936. Complete data on the catch of the fisheries of the Lake States were also collected for 1933 and 1935.

Following is a summary indicating the years for which statistics were collected on the fisheries and fishery industries in the various sections. Figures for the more recent years are available for free distribution from the Bureau in bulletin form, but figures for the earlier years are available only in the various printed reports of the Bureau. These reports are available for reference in the Bureau's library and at many public libraries.

In the New England States statistics on the catch of the marine fisheries, and those conducted in the coastal rivers and bays of these States, were collected for the years 1880, 1887, 1888, 1889, 1898, 1902, 1905, 1908, 1919, 1924, 1928, 1929, 1930, 1931, 1932, 1933, and 1935. For most of these years data on operating units and wholesale and manufacturing trade also were collected. In addition to the above, a partial statistical survey was made for the entire section in 1892; a partial survey of the fisheries in Maine, New Hampshire, and Massachusetts for the fiscal year 1897; the lobster fishery for 1900 and 1913; the oyster fishery for 1910; the shad and alewife fisheries for 1896; the menhaden industry for 1912; the fisheries of Massachusetts for 1879; and the fisheries of Connecticut for 1925 and 1926.

Statistics on the catch of the marine fisheries and those conducted in the coastal rivers and bays of the Middle Atlantic States were collected for the years 1880, 1887, 1888, 1889, 1890, 1891, 1897, 1898, 1901, 1904, 1908, 1921, 1926, 1929, 1930, 1931, 1932, 1933, and 1935. Data on operating units and wholesale and manufacturing trade also were collected for most of these years. In addition to these a statistical survey was made of the coastal fisheries of these States in 1915; catch in all States except New York, in 1892; the shad and alewife fisheries in 1896; the shad fisheries of the Delaware River in 1910; the shad fisheries of the Chesapeake Bay and tributaries in 1909; the menhaden industry in 1912; the lobster fisheries in 1900 and 1913; and the oyster fishery in 1911. The years for which statistics are available on the shad fishery of the Hudson River are given in the section entitled "Shad and alewife fisheries."

In the Chesapeake Bay States statistics on the catch of the marine fisheries and those conducted in coastal rivers and bays of these States were collected for the years 1880, 1887, 1888, 1890, 1891, 1897, 1901, 1904, 1908, 1920, 1925, and for all the years from 1929 to 1936, inclusive. Data on operating units and wholesale and manufacturing trade also were collected for most of these years. In addition to the above, a statistical survey was made of the crab fishery for 1915; the oyster fishery and menhaden industry for 1912; and the shad and alewife fisheries for 1896, 1909, and 1915. The years for which statistics of the shad and alewife fisheries of the Potomac River are available are given in the section entitled "Shad and alewife fisheries."

In the South Atlantic and Gulf States statistics on the catch of the marine fisheries and those conducted in the coastal rivers and bays of these States were collected for the years 1880, 1888, 1889, 1890, 1897 1902, 1908, 1918, 1923, 1927, 1928, 1929, 1930, 1931, 1932, 1934, and 1936. Data on operating units and wholesale and manufacturing trade also were collected for most of these years. In addition to the above, a

statistical survey was made of the fisheries of these States, excluding Florida and Alabama, for 1887; the shad fishery of the South Atlantic States for 1910; the shad and alewife fisheries of the South Atlantic States for 1896; the sturgeon fishery of Florida for 1900; the menhaden industry of the South Atlantic States for 1912; the shrimp fishery for 1916; the oyster fishery of the South Atlantic States for 1910; and the oyster fishery of the Gulf States for 1911.

In the Pacific Coast States statistics on the catch of the marine fisheries and those conducted in the coastal rivers and bays of these States were collected for the years 1880, 1888, 1892, 1895, 1899, 1904, 1908, 1915, and for all the years from 1922 to 1936, inclusive. These surveys have usually included data on operating units and wholesale and manufacturing trade. In addition to the above, statistics were obtained on the fisheries of California from 1918 to 1921, inclusive, and for the oyster fishery in 1912.

Statistics on the catch of the fisheries of the Great Lakes were collected for the years 1880, 1885, 1890, 1893, 1899, 1903, 1908, and for all the years from 1913 to 1936, inclusive. Statistics of the operating units and of the wholesale and manufacturing trade were collected for most of the years when canvasses were made from 1880 to 1908, and in 1917 and 1922 as well as in most of the years from 1926 to 1936, inclusive. In addition to the above a survey was made of the fisheries of Lake Ontario and of certain fisheries in other lakes for the year 1897.

Statistics of the catch of the fisheries of the Mississippi River and its tributaries were collected for the years 1894, 1899, 1903, 1908, 1922, and 1931. In addition, figures have been obtained of the fisheries of Lakes Pepin and Keokuk for the years 1914 and 1917 and the years from 1927 to 1936, inclusive, and of the fisheries of the Mississippi River between Lakes Pepin and Keokuk for the years 1929 to 1936, inclusive.

Statistics also were collected on the fisheries of certain interior waters, other than the fisheries of the Great Lakes and the Mississippi River and its tributaries, for the years 1894, 1895, 1900, and 1902.

Statistical agents.—The statistics contained in this volume have been collected by a corps of trained statistical and marketing agents which comprises a part of the permanent staff of the Division of Fishery Industries of the Bureau. Most of these men have been with the Bureau for a period of 5 years or more. In the main they are college graduates and were recruited through civil-service examination. While in college, most of the men pursued biological or technical courses, largely in fishery work, which has especially suited them for coping with the many biological and technical aspects encountered in canvassing the fisheries. This training has been especially helpful in identification of the species which, because of the many local names applied to a particular species, causes considerable confusion.

Period covered.—In conducting the fishery statistical surveys, agents are dispatched to the districts to be surveyed as early in the calendar year as they can be spared from the tabulation and preparation for publication of their previous season's work. They collect statistics of fishery operations for the year preceding that in which they are working; and, since their field work occupies the greater part of the year, it is usually at least a year from the end of the calendar year for which they are collecting data until the figures are published. Most of

the figures are collected for the calendar year. Where there are variations from this general practice, explanatory notes appear in the tables. Prior to 1930, statistics on the catch of oysters in the Atlantic and Gulf States were collected for the oyster season; that is, from September to April, inclusive. Beginning with 1930 and down to the present, they have been collected on the basis of the calendar year.

Scope.—The scope of the coastal statistical surveys includes canvasses of the commercial fisheries of the oceans and bays and of the coastal rivers as far inland as commercial fishing is important. This usually coincides with the range of commercial fishing for anadromous species. Statistics of the fisheries of the Mississippi River cover canvasses of the fisheries of the Mississippi River proper as well as all of its tributaries wherein commercial fishing for either fish, crustaceans, or mollusks is prosecuted. Statistics of the fisheries of the Great Lakes cover canvasses of the fisheries prosecuted in the Lakes proper, adjacent bays, and the international lakes of northern Minnesota, as well as rivers which sustain a commercial fishery having outlets into these waters. Surveys for statistics of the wholesale and manufacturing fishery industries cover such plants located in the coastal, river, and lake areas adjacent to the waters mentioned above.

Methods of collection.—Several methods for the collection of fishery statistics are employed, each of which has been carefully studied to obtain the best results with the available personnel and funds. In most instances the agents obtain lists of the names of fishing vessels, names or numbers of motorboats, and names of owners of these craft from local customs officials. Also it often is possible to obtain the names of licensed commercial fishermen and occasionally some statistics on the catch from several of the State fishery agencies; from other State, county, or city agencies; or from private organizations.

With such preliminary records as are available for their guidance the agents then visit each fishing community in their field unless their preliminary records are so complete that personal visits in some areas may be eliminated. While it is impossible for the few agents available for this work to interview each fisherman in a given locality, the more important ones are visited, and a sufficient number of those of lesser importance are interviewed to obtain reliable information on their production. In practice virtually all wholesale firms are visited, as well as captains of fishing vessels (those of 5 net tons or over), and also most of the more important inshore fishermen.

In the Great Lakes and Pacific Coast States such exceptional cooperation has been obtained in recent years from the State fishery agencies in the collection of statistics that only fragmentary surveys need be made by the Bureau's agents to obtain the necessary data. Also the State fishery agencies in Delaware, Maryland, and Virginia recently have developed very complete statistical systems which greatly facilitate the Bureau's canvasses in these States.

As regards the fisheries of the Great Lakes and international lakes of northern Minnesota the Bureau obtains most of the catch statistics and usually the value of the catch direct from the records of the State fishery agency. To obtain data on the number of fishermen, boats, vessels, and gear the Bureau conducts such personal surveys among the fishermen as may be necessary to supplement the State records.

Bureau agents are stationed at Seattle, Wash., and Terminal Island, Calif., who survey the fisheries of the Pacific Coast States. As a rule they obtain figures on the volume of the catch from the records of the several State fishery agencies. In most cases the value of the catch is derived from dealers' records and sometimes from estimates of prices. In Washington and Oregon the offshore fisheries are surveyed separately by the Bureau's agent to obtain data on the number of operating units, catch, and value of the catch. Statistics of the wholesale fishery industry for this section are obtained largely by personal interviews of the agents.

In the administration of the Alaska fisheries the Bureau obtains sworn statements concerning their activities from those prosecuting the fisheries in this area. These statements are compiled by the Alaska Division of this Bureau.

Statistics of the volume of the catch of fish of the Pacific Coast and Great Lakes States are usually shown in weights as landed, which may be in the round or dressed condition. Statistics on the volume of the catch of fish taken in the remainder of the United States are shown in round weight.

The figures in the tables for shellfish represent the weight of the meats in the case of univalve and bivalve mollusks and gastropods, and the round weight of crustaceans and such mollusks as squid and octopus.

Shore and vessel fisheries.—In general, statistics of the shore fisheries, as collected by the agents, include data on the number of casual and regular fishermen; number of motor and other fishing boats and accessory boats; kind and quantity of gear used, and the volume, value, and method of capture of each species caught by boats (for our purpose craft of less than 5 net tons capacity are called "boats") for each locality or group of localities. This method is not followed in some sections where the availability of data collected by the State fishery agencies obviates the necessity of detailed locality surveys.

Statistics of the vessel fisheries include data on the number of the crew, rig of vessels, net tonnage, kind and quantity of gear used, accessory boats carried, and volume, value, and method of capture of each species caught by each vessel (for our purpose craft of 5 net tons' capacity or more are called "vessels"). As in the shore fisheries, the availability of figures collected by State fishery agencies may eliminate the necessity of our agents collecting these data for each vessel.

All persons engaged in commercial fishing operations are included as fishermen. For our purpose these have been divided into "regular" and "casual" fishermen. Regular fishermen are those who receive more than one-half of their annual income from fishing; and casual fishermen are those whose principal business is something other than fishing, and who receive less than one-half of their annual compensation from fishing.

The catch of fish is credited to the principal port of arrival and departure of the craft rather than its point of ownership, registration, documentation, or its port of landing. This accounts for catches of fish being shown in areas where they are not common, since fishing vessels frequently fish in areas far from their principal fishing port.

Wholesale and manufacturing trade.—All persons or firms engaged in the wholesale buying and selling of fishery products or who produce manufactured fishery products are surveyed under this title. Where the business of fishing and wholesaling or manufacturing is combined, that part of the business devoted to either of the latter two phases is included in the wholesale and manufacturing survey and the part devoted to fishing is included in the shore or vessel fisheries. If a wholesale business is conducted with no manufacturing and the business is so small that the full time of one man over the whole year or season is not required, it is then disregarded as a wholesale business. If commodities other than fishery products are handled, the persons engaged, and salaries and wages paid, are prorated; and only that part concerned with fishery products is included. If such a firm required less than the full time of one man over the whole year or season and if it does not manufacture, it is not included in the canvass. Retail firms that manufacture or whose wholesale business exceeds the retail part are included. Persons or firms engaged in the motortrucking of fishery products are included as wholesalers if they are engaged in wholesale buying and selling.

Buyers for a central firm are not canvassed as wholesale dealers unless they ship direct to the firm's customers from the buying point.

Fishermen or fishing concerns, except manufacturers, who do not buy fishery products are not included under this heading except that oyster-shucking firms are included provided shuckers are employed, and irrespective of whether all or part of the oysters used are taken from the firms' privately owned beds.

Manufacturing concerns include those which prepare packaged fishery products; salted, spiced, smoked, dried, or otherwise cured fishery products; canned fishery products; or fishery byproducts.

Fishermen who manufacture are surveyed to obtain the number of persons so employed and the volume and value of the products prepared.

In collecting statistics of manufacturing firms, the agents obtain data on the production for each plant in producing areas of products as marketed by the plant. Such products are usually "final" and in form for consumption; however, the products may be "intermediate" and require further processing before reaching the consumer markets. An outstanding example of an intermediate product is green-salted groundfish which almost invariably is further processed before final marketing. In reviewing the statistics of manufactured products it should be observed that intermediate products are not shown where they are prepared to the final stage in the original plant. An exception to this rule, however, is in the case of the production of mild-cured salmon, which, on account of its importance, is shown in its entirety, whether further processed in the producing plant or not. In this connection it should also be stated that several of the byproducts for which statistics are shown may be intermediate, and the plants producing the final products are not surveyed by this Bureau. Outstanding among such products are marine-animal oils, scrap, and meal.

Statistics of persons engaged in wholesale and manufacturing establishments are reported in three groups: Proprietors, salaried employees, and wage earners.

Proprietors represent those persons who devote their time to the conduct of the enterprise and receive their compensation in the form of profits. Managers of branch houses are not classified as proprietors.

Salaried employees usually include those persons paid by the week or month, while wage earners usually consist of those paid on a per diem or piece-work basis. This, however, is not true in all cases, since the distinction between these two classes depends primarily on the character of the work done rather than the unit of time employed for calculating rates of pay. In general, office employees are classified as salaried employees. Other employees, including plant workmen, are classed as wage earners. Plant foremen or superintendents are classified as salaried employees unless they are principally engaged in manual labor; in which case they are classified as wage earners. Active officers of corporations are classified as salaried employees. Statistics of wage earners are shown in two forms: The average number employed during the operating season; and the average number employed during the year (the monthly average for the year).

Transporting trade.—Statistics are obtained on the number of the crew and number of boats and vessels engaged in transporting fishery products from the fishing grounds to port or from port to port. However, if a craft is engaged in catching fish at any time of the year it is included as a fishing craft rather than as a transporter.

Publication of data.—Statistics of employment in the fisheries, craft and gear engaged, catch and value of catch, and certain data on industries related to the fisheries are summarized and published in bulletin form as soon as possible after completion of each survey. Later the figures in more detail are included in the annual reports of the Division.

LOCAL AND SPECIAL SURVEYS

Landings at certain important United States ports.—Statistics of the landings of aquatic products at the principal New England ports (Boston and Gloucester, Mass., and Portland, Maine) are obtained in a similar manner. An agent is permanently stationed at Boston, Mass., and another is assigned to the ports of Gloucester, Mass., and Portland, Maine. Their duties include the obtaining of figures daily on the quantity of fish landed by each fishing vessel, the value of such fish landed, information concerning the date of departure and arrival of the vessel, and they also indicate the grounds from which the fish were taken and gear used in their capture. These data are forwarded to the Bureau, where compilations are made. Products of American fisheries received duty free at Boston and Gloucester, Mass., and Portland, Maine, from the treaty coasts of Newfoundland, Magdalen Islands, and Labrador are included in the landings at these ports; however, they are not included in the catch in sectional fishery surveys of the New England States unless they represent a catch by United States vessels. Statistics of these landings are released monthly and annually in bulletin form and detailed data are published in the annual reports of this Division. Data on the landings at Boston, and Gloucester, Mass., have been collected annually since 1893, and those for Portland, Maine, since June 1915. Some data are available for Boston and Gloucester prior to 1893.

Statistics of the landings of fish at Seattle, Wash., are collected by the Bureau's agent in that city. Landings are classified as those

made by United States fishing vessels and those received by Seattle wholesale dealers. The landings credited to United States fishing vessels are made by vessels operating distinctly as primary fishing units, usually in the offshore fisheries, while those credited as received by wholesale dealers are usually products of the shore fisheries collected mainly from points in Puget Sound and do not include fish received from Alaska or Canada, or landings made by the halibut fleet. Statistics of these landings at Seattle are released monthly and annually in bulletin form and detailed data are published in the annual reports of this Division. Statistics of the landings by fishing vessels at Seattle have been collected since June 1915 and certain data on products received by Seattle wholesale dealers since December 1915.

Statistics of the fishery products handled at the municipal wharf, Washington, D. C., are reported to the Bureau by agents of the Health Department in Washington. They are not published in bulletin form, but a summary of the year's activities is published in the annual reports of the Division. Data on products handled at the municipal wharf are available since 1921.

Atlantic mackerel fishery.—Statistics on the catch by the Atlantic mackerel fleet are obtained by combining the figures of mackerel landed at Boston and Gloucester, Mass., and Portland, Maine, with those obtained by Bureau agents, who in recent years have been stationed at other Atlantic ports where mackerel are landed. These agents obtain data on the volume of mackerel landed in a manner similar to that used to obtain figures on the landings by fishing vessels at the three New England ports. The figures include only the catches made by purse seine and drift gill net craft and are not complete for craft of under 5 net tons' capacity using this type of gear. Statistics of this fishery appear only in the annual reports of this Division, although the landings at the principal New England ports appear in the monthly and annual bulletins published for those ports. Statistics of this fishery are available from 1905 to 1936, inclusive.

Shad and alewife fisheries.—Owing to the importance of the Hudson and Potomac Rivers in the production of shad, surveys for statistics of the catch, value of the catch, and operating units are made annually. On the Potomac River similar statistics also are obtained for the alewife fishery. Much of the data required for these surveys are available from the State fishery agencies.

Statistics of the shad and alewife fisheries are not published separately in bulletin form, but a summary of the year's activities is published in the annual reports of the Division.

Statistics of the shad fishery of the Hudson River are available for 1896, 1897, 1898, 1901, 1904, 1910, and from 1915 to 1936, inclusive, while data for the shad fishery of the Potomac River are available for 1896, 1901, 1904, 1909, 1915, and from 1919 to 1936, inclusive. Statistics of the alewife fishery of the Potomac River are available for 1896, 1909, 1915, and from 1919 to 1936, inclusive.

Pacific halibut fishery.—Statistics of the Pacific halibut fishery are obtained by the Bureau's agent in Seattle, aided by Bureau representatives in Alaska and the International Fisheries Commission. The fleet classification has been arbitrarily applied by including in the "Washington fleet" all United States and Alaska vessels that land more than half of their catch in that State. All other United States and Alaska vessels of the halibut fleet are included in the "Alaska

fleet." Monthly and annual statistical bulletins are available on this fishery, being published along with the statistics of the landings of fishery products at Seattle, Wash., and detailed statistics are published in the annual reports of the Division. Statistics of the landings of halibut at Pacific coast ports have been collected since 1925.

Canned fishery products and byproducts.—Beginning in 1921, the Bureau has made annual surveys for statistics of the canned fishery products and byproducts industries of every section. These are begun the first week in January of each year for statistics of the production in the preceding year. The surveys usually occupy 6 to 9 weeks' time. During this period the Bureau obtains by mail, so far as possible, the production of canned fishery products or byproducts from each plant in the United States engaged in this business. Where it is impossible to obtain reports by mail the report is obtained by personal visit by the Bureau's agents. They obtain statistics of the production and value of the production for each commodity. Statistics of the canned fishery products and byproducts produced in Alaska are received on the same statements obtained by the Bureau that include statistics of general fishery operations.

An annual statistical bulletin is issued on this trade, and detailed statistics of the output are published in the annual reports of the Division. In addition to the data obtained on the output of these products annually since 1921, data also usually were obtained prior to 1921 for the years the various sections were surveyed.

The value shown for canned products constitutes the gross amount received by the packer at the production point, no deductions being made for commission or expenses.

Packaged-fish trade.—Complete statistics of the annual production and value of fish packaged in the United States are obtained as a part of the survey for the statistics of the canned fishery products and byproducts industries. These statistics are released in bulletin form annually and detailed statistics are published in the annual reports of the Division. Statistics of the production of packaged fish are available for 1926 and the years from 1928 to 1936, inclusive.

Cold-storage holdings of fish.—An arrangement has been made with the Bureau of Agricultural Economics, Department of Agriculture, whereby statistics of the cold-storage holdings of the various species of fish, by sections of the United States are furnished to this Bureau monthly. Included with statistics of the holdings are statements of the quantity of the various species of fish frozen and also the holdings of certain cured fish. Bulletins showing these statistics are issued monthly as well as annually, and detailed statistics are published in the annual reports of this Division. Statistics of cold-storage holdings of fishery products have been published since 1917 and data on quantities of fish frozen, for the years from 1920 to 1925, inclusive, and from 1928 to 1936, inclusive.

Sponge market, Tarpon Springs.—A large proportion of the total output of sponges in Florida is handled through the sponge exchange at Tarpon Springs. In view of this, the Bureau has obtained from a representative of the exchange annual statistics of the quantity and value of the sponges, by variety classification, handled through it annually. Statistics of the quantity of sponges handled through the exchange are not published in bulletin form, but a summary of the year's activities is published in the annual reports of this Division.

Statistics of the transactions on the sponge exchange are available for 1913, 1914, and for the years from 1917 to 1936, inclusive.

Foreign fishery trade.—Statistics of the foreign fishery trade are obtained from compilations made by the Bureau of Foreign and Domestic Commerce, Department of Commerce. Statistics of all known fishery products imported or exported have been assembled in one table and published annually in the reports of the Division in recent years. For earlier years they are available in the reports of the Bureau of Foreign and Domestic Commerce, the Bureau of Statistics, the Department of Commerce and Labor, or the Treasury Department.

PRACTICES AND TERMS

Certain practices and terms of importance used in the compilation of fishery statistics are explained below.

Days absent.—In computing "days absent" for vessels landing fares at the various ports, the day of departure and the day of arrival are included; thus a vessel leaving port on the 8th of the month and returning on the 15th of the month will be shown as being absent 8 days.

Operating units.—Operating units as referred to in this document include persons engaged in the fisheries, and fishing craft and gear employed.

Vessel.—The term "vessel" refers to a craft having a capacity of 5 net tons or more.

Boat.—The term "boat" refers to a craft having a capacity of less than 5 net tons.

Incidental catch.—The term "incidental catch" refers to the catch of certain species by a type of gear which ordinarily does not capture such species.

Percentages.—Percentages are usually shown as whole numbers. Fractions of percents are dropped if less than five-tenths, and the percentage is raised to the next higher integer if the fraction is greater than five-tenths. If the fraction is exactly five-tenths, the integer is raised or lowered to make it an even number.

Converting.—Many of the figures shown in the statistical tables published herewith have been converted to thousands of pounds or dollars. In making these conversions the largest number from which a group of items is computed is raised or lowered to the nearest thousands place. If the number ends in an even 500, the thousands integer is raised or lowered to make it an even number. The individual items are changed to conform to the total thus obtained.

Confidential data.—The statistical data collected by the Division are confidential and are not released except by approval of the Washington office. Statistics of production of wholesale and manufacturing firms are published only for commodities or geographical areas where the production of three or more concerns may be grouped. Every effort is made to publish only those figures which will not reveal individual enterprise.

CONVERSION FACTORS

It is the policy of the Bureau to show the detailed catch figures of all products in pounds for the sake of uniformity and for purposes of

comparison. Following such a policy presents certain problems. In the case of fish there is little difficulty since in very rare instances are such products reported in units of measure other than pounds. For shellfish, however, the units of measure may be bushels, sacks, barrels, or thousands of shellfish, gallons of meats, etc. These many units make standardization difficult, but when coupled with the wide variation in the requirements or definition of some of these units in the various States the problem becomes even more complex.

All bivalve mollusks are reported in pounds of meats in the detailed catch tables presented in this report. In addition, there are included supplementary tables for most of the sections, which give data on the production in bushels. These supplementary tables also give the production of certain other shellfish, such as crabs, in number.

Oysters.—Probably the greatest problem in presentation of fishery statistics in uniform units of measure is in the case of oysters. Usually the production of oysters on the Atlantic and Gulf coasts is reported to Bureau agents in bushels; and prior to the data obtained for the year 1930 conversion from bushels to pounds of meats was effected on the basis of a uniform yield of 7 pounds of meats to the bushel. However, more recent investigations have shown considerable variation from this figure. There follows a table which gives the results of these studies of the measures used for oysters in the various States and of the average yields per bushel. This table presents the factors that have been used in the oyster statistics given in this report.

Measures and yields of oysters [1]

State	Capacity of State bushel	Variation from United States standard bushel		Market oysters	
				Yield per State bushel	Yield per standard bushel
	Cubic inches	*Cubic inches*	*Percent*	*Pounds of meats*	*Pounds of meats*
Massachusetts	2,150.4	----------	----------	6.57	6.57
Rhode Island	2,150.4	----------	----------	7.31	7.31
Connecticut	2,150.4	----------	----------	8.00	8.00
New York	2,150.4	----------	----------	7.00	7.00
New Jersey	2,257.3	+106.9	+5.0	8.91	8.49
Delaware	2,257.3	+106.9	+5.0	7.00	6.67
Maryland	2,801.5	+651.1	+30.3	6.15	4.72
Virginia	3,003.4	+853.0	+39.7	5.42	3.88
North Carolina	2,801.9	+651.5	+30.3	4.96	3.81
South Carolina	4,071.5	+1,921.1	+89.3	4.64	2.45
Georgia	5,343.9	+3,193.5	+148.5	6.01	2.42
Florida	3,214.1	+1,063.7	+49.4	4.18	2.80
Alabama	2,826.2	+675.8	+31.4	4.11	3.13
Mississippi	2,826.2	+675.8	+31.4	3.59	2.73
Louisiana	2,148.4	−2.0	−0.1	3.77	3.77
Texas	2,700.0	+549.6	+25.6	4.92	3.92

[1] Data on yield for the Chesapeake, and the South Atlantic and Gulf States are for 1936. Other data are for 1935.

Other mollusks.—The following table shows the conversion factors for various mollusks, other than oysters, used in this report.

Average yields of certain mollusks in pounds of meats per bushel [1]

State	Clams, hard		Clams, soft		Clams, surf	Clams, razor	Mussels, sea	Periwinkles and cockles	Scallops, bay	Scallops, sea	Conchs
	Public	Private	Public	Private							
Maine	11		15				12	15		6	
New Hampshire			15								
Massachusetts	11.01	11	13.64		17	31.68		18	6.13	6	
Rhode Island	16	16	20					18	7	7	
Connecticut	10	10	14.94						5.75		
New York	8	8	16	16	12		10		5	6	18
New Jersey	9.76	9.76	20		12.5		13			5.88	
Delaware	10	10					13				
Maryland	8										
Virginia	8.02	8					12				
North Carolina	8								6		
South Carolina	8										
Florida	8								5		

[1] Data for the Chesapeake, and South Atlantic and Gulf States are for 1936. Other data are for 1935.

Other conversion factors.—The principal other conversion factors that have been used in this report are as follows:

Alewives	To convert number of fish to weight in pounds, multiply by 0.4.
Cod, large, salted	To convert to fresh-gutted weight, multiply by 1.90.
Cod, market, salted	To convert to fresh-gutted weight, multiply by 1.94.
Cod, scrod, salted	To convert to fresh-gutted weight, multiply by 1.98.
Crustaceans:	
Crabs, soft and peelers (Connecticut, New York, New Jersey, Delaware, Maryland, and Virginia).	To convert number of crabs to weight in pounds, divide by 4.
Crabs, soft and peelers (Louisiana).	To convert number of crabs to weight in pounds, divide by 2.9.
Crabs, soft and peelers (other States).	To convert number of crabs to weight in pounds, divide by 3.
Crabs, hard (Georgia, North Carolina, and South Carolina).	To convert number of crabs to weight in pounds, divide by 2.
Crabs, hard (Florida)	To convert number of crabs to weight in pounds, divide by 2.01.
Crabs, hard (Alabama)	To convert number of crabs to weight in pounds, divide by 2.06.
Crabs, hard (Mississippi)	To convert number of crabs to weight in pounds, divide by 2.18.
Crabs, hard (Louisiana)	To convert number of crabs to weight in pounds, divide by 2.15.
Crabs, hard (Texas)	To convert number of crabs to weight in pounds, divide by 2.30.
Crabs, hard (other Atlantic Coast States)	To convert number of crabs to weight in pounds, divide by 3.
Cusk, salted	To convert to fresh-gutted weight, multiply by 1.90.
Haddock, large, salted	To convert to fresh-gutted weight, multiply by 2.06.
Haddock, scrod, salted	To convert to fresh-gutted weight, multiply by 2.10.
Hake, large, salted	To convert to fresh-gutted weight, multiply by 1.90.
Hake, small, salted	To convert to fresh-gutted weight, multiply by 1.98.

Halibut, salted	To convert to fresh-gutted weight, multiply by 2.
Herring, salted	To convert to round weight, multiply by 1.50.
Mackerel, salted	To convert to round weight, multiply by 1.35.
Menhaden	To convert number of fish to weight in pounds, multiply by 0.6.
Pollock, salted	To convert to fresh-gutted weight, multiply by 1.90.
Sponges, dried (Florida):	
Large wool	To convert number of bunches to weight in pounds, multiply by 3.5.
Medium wool	To convert number of bunches to weight in pounds, multiply by 1.75.
Small wool	To convert number of bunches to weight in pounds, multiply by 1.
Wool rags	To convert number of bunches to weight in pounds, multiply by 2.25.
Grass	To convert number of bunches to weight in pounds, multiply by 1.
Wire	To convert number of bunches to weight in pounds, multiply by 1.5.
Yellow	To convert number of bunches to weight in pounds, multiply by 1.25.

COMMON AND SCIENTIFIC NAMES OF FISHERY PRODUCTS

In order to prevent misunderstanding in the use of common names employed in the tables and discussions, the following list of common and scientific names is given:

Common and scientific names of the commercial fishery products caught in the United States and Alaska

Common name as shown in Bureau reports	Other common names	Scientific names
Albacore	See tuna	
Alewives	Branch herring, wall-eyed or big-eyed herring.	*Pomolobus pseudoharengus.*
	Blueback, glut herring	*Pomolobus æstivalis.*
Amberjack		Seriola species.
Anchovies		*Engraulis mordax.*
		Anchoviella delicatissima.
		Anchoviella compressa.
Angelfish		*Pomacanthus arcuatus.*
		Angelichthys isabelita.
Barracuda		*Sphyraena argentea.*
Black bass	Smallmouth bass	*Micropterus dolomieu.*
	Largemouth bass	*Micropterus salmoides.*
Bluefish	Tailor	*Pomatomos saltatrix.*
Blue pike	Pike perch, blue pickerel (Canada)	*Stizostedion glaucum.*
Blue runner or hardtail	Runner	*Caranx crysos.*
Bonito		*Sarda sarda.*
		Sarda chiliensis.
Bowfin		*Amia calva.*
Buffalofish		Ictiobus species.
Butterfish		*Poronotus triacanthus.*
Burbot	Lawyer, ling	*Lota maculosa.*
Cabio	Coalfish, crab eater, cobia	*Rachycentron canadus.*
Cabrilla	Rock bass	*Epinephelus analogus* (Pacific coast).
Carp	German carp	*Cyprinus carpio.*
Catfish and bullheads		Ameiurus species.
		Ictalurus species.
		Leptops olivaris.
Chubs	Tullibee in Canada; longjaw, bluefin, blackfin in United States.	All *Leuchichthys* except *artedi* (in Great Lakes).
Cigarfish	Scad	*Decapterus punctatus.*
Cisco	Herring in Canada	*Leucichthys artedi* (Lake Erie only).
Cod	Codfish	*Gadus macrocephalus* (Pacific coast).
		Gadus callarias (Atlantic coast).
Crappie	White crappie	*Pomoxis annularis.*
	Black crappie, strawberry bass, calico bass.	*Pomoxis sparoides.*
Crevalle		*Caranx hippos.*
Croaker	Crocus, hardhead	*Micropogon undulatus.*

Common and scientific names of the commercial fishery products caught in the United States and Alaska—Continued

Common name as shown in Bureau reports	Other common names	Scientific names
Cunner	Chogset, blue perch, bergall	*Tautogolabrus adspersus.*
Cusk		*Brosme brosme.*
Dolly Varden trout	Salmon trout, bull trout	*Salvelinus parkei.*
Dolphin		*Coryphaena hippurus.*
Drum:		
Black		*Pogonias cromis.*
Red	Channel bass, redfish, spotted bass	*Sciaenops ocellatus.*
Eels:		
Common		*Anguilla rostrata.*
Conger		*Leptocephalus conger.*
Flounders	Flounders, flukes, soles, "California halibut," dabs.	Pleuronectidae species.
Flyingfish		*Cypsilurus californicus.*
Frigate mackerel	"Boo Hoo"	*Auxis thazard.*
Garfish	See sea gar	
Gizzard shad	Nanny shad, mud shad	*Dorosoma cepedianum.*
Goldeye		Hiodon species.
Goldfish	Sand perch	*Carassius auratus.*
Goosefish	Allmouth	*Lophius piscatorius.*
Grayfish	Dogfish	*Squalus sucklii* (Pacific coast).
	Spiny dog	*Squalus acanthias.*
	Smooth dog	*Mustelus mustelus.*
Groupers	"Sea bass"	Epinephelus species. Myceteroperca species.
Grunts	Margatefish, sailors choice (Key West)	Haemulon species.
Haddock		*Melanogrammus aeglefinus.*
Hake	Squirrel hake, Boston hake, ling, black hake, mud hake.	Urophycis species (Atlantic coast).
	Merluccio	*Merluccius productus* (Pacific coast).
Halibut		*Hippoglosuss hippoglossus.*
Hardhead		*Orthodon microlepidotus* (Pacific coast).
Harvestfish	Starfish, dollarfish, pappyfish; butterfish (N. C.).	*Peprilus alepidotus.*
Herring:		
Lake	Herring	*Leucichthys artedi* (Great Lakes, except Erie).
Round		*Etrumeus sadina.*
Sea		*Clupea harengus* (Atlantic coast). *Clupea pallasii* (Pacific coast).
Herring smelt	Sea smelt	*Argentina silus.*
Hickory shad	Tailor shad, skip	*Pomolobus mediocris.*
Hogfish	Capitaine, perro perro	*Lachnolaimus maximus* (Florida).
Horse mackerel	Pacific	*Trachurus symmetricus.*
	Atlantic—See tuna.	
Jewfish		*Promicrops itaiara.*
Kingfish	King mackerel, cerro	*Scomberomorus cavalla* (Atlantic coast).
	Little roncador, croaker	*Scomberomorus regalis* (Atlantic coast). *Genyonemus lineatus* (California).
King whiting	Northern whiting, kingfish, sea mink	Menticirrhus species.
Lake trout		*Cristivomer namaycush.*
Lamprey		*Petromyzon marinus.*
Launce	Sand eel, lant, sand launce	*Ammodytes americanus.*
"Lingcod"	Cultus cod, blue cod, buffalo cod, ling	*Ophiodon elongatus.*
Mackerel		*Scomber scombrus* (Atlantic coast). *Scomber diego* (Pacific coast).
Marlin	Spearfish	*Tetrapturus mitsukurii* (Pacific coast).
Menhaden	Mossbunker, pogy, fatback	*Brevoortia tyrannus.*
Minnows		Cyprinidae species.
Mojarra		Eucinostomus species.
Mooneye	Toothed herring	Hiodon species.
Moonfish		*Vomer setipinnis.* *Selene vomer.*
Mullet	Jumping mullet	Mugil species.
Mummichog	Mayfish, killifish	Fundulus species.
Muttonfish		*Lutianus analis.*
Paddlefish	Spoonbill cat	*Polyodon spathula.*
Perch (California)	See surffishes.	
Permit	See pompano.	
Pigfish	Hogfish (N. C.)	*Orthopristis chrysopterus.*
Pike or pickerel	Great Lakes pike	*Esox reticulatus.* *Esox lucius.*
Pilchard	Sardine	*Sardina caerulea.*
Pilotfish		*Naucrates ductor.* *Seriola zonata.*
Pinfish	Bream, salt-water bream	*Lagodon rhomboides.*
Pollock		*Pollachius virens.*
Pompano	Permit, great pompano	*Trachinotus goodei.*
		Trachinotus species (Atlantic coast).
		Palometa simillima (Pacific coast).
Porgies	Porgee	Calamus species.
Porkfish	Sisi	*Anisotremus virginicus.*

Common and scientific names of the commercial fishery products caught in the United States and Alaska—Continued

Common name as shown in Bureau reports	Other common names	Scientific names
Quillback	Spearfish or skimfish	Carpiodes species.
Roach	Shiner	*Notemigonus crysoleucas.*
Rock bass	Redeye, goggle-eye	*Ambloplites rupestris* (Mississippi River to Atlantic seaboard).
	Groupers	*Paralabrax nebulifer* (Pacific coast).
Rockfishes	Rock cod	Sebestodes species (Pacific coast).
Rosefish		*Sebastes marinus.*
Rudderfish	Blue bass, greenfish	*Girella nigricans* (Pacific coast).
	Halfmoon	*Medialuna californiensis* (Pacific coast).
Sablefish	Black cod	*Anoplopoma fimbria.*
Salmon:		
Atlantic		*Salmo salar* (Atlantic coast).
Pacific:		
Blueback, red, or sockeye.		*Oncorhynchus nerka.*
Chinook or king	Tyee, spring	*Oncorhynchus tschawytscha.*
Chum or keta	Dog salmon	*Oncorhynchus keta.*
Humpback or pink.		*Oncorhynchus gorbuscha.*
Silver or coho		*Oncorhynchus kisutch.*
Steelhead	See steelhead trout.	
Sauger	Sand pike	*Stizostedion canadense.*
Sculpin		Cottidae species.
Scup	Paugy or porgy, fair maid	Stenotomus species.
Sea bass	Black jewfish or black sea bass	*Stereolepis gigas* (Pacific coast).
	Black sea bass, blackfish	*Centropristes striatus* (Atlantic coast).
	White sea bass	*Cynoscion nobilis* (Pacific coast).
Sea catfish	Gafftopsail	*Bagre marina.*
Sea robin		Prionotus species.
Shad	American shad	*Alosa sapidissima.*
Sharks		Carcharodon species: Mustelus species; Carcharhinus species; *Sphyrna* species.
Sheepshead		*Archosargus probatocephalus* (Atlantic coast).
		Archosargus unimaculatus (Florida).
	Drum, fresh water	*Aplodinotus grunniens* (fresh water).
Sheepshead, California	Redfish, fathead	*Pimelometopon pulcher.*
Silver perch	Sand perch	*Bairdiella chrysura.*
Silversides	Spearing	Menidia species.
Skates		Raja species.
Skipper	Billfish	*Scombersox saurus.*
Smelts		*Osmerus mordax* (Atlantic coast).
		Argentinidae species (Pacific coast).
	Eulachon	*Thaleichthys pacificus.*
Snapper:		
Mangrove	Gray snapper	*Lutianus griseus.*
Red		*Lutianus blackfordii.*
Snook	Robalo, sergeantfish	*Centropomus undecimalis.*
Spadefish	Porgy (N. C.)	*Chætodipterus faber.*
Spanish mackerel		*Scomberomorus maculatus.*
Splittail		*Pogonichthys macrolepidotus.*
Spot	Lafayette, goody	*Leiostomus xanthurus.*
Squawfish	Sacramento pike	*Ptychocheilus grandis.*
Squeteague:		
Gray	Gray trout, weakfish, trout	*Cynoscion regalis.*
Spotted	Spotted weakfish, spotted trout	*Cynoscion nebulosus.*
White	Sand trout	*Cynoscion arenarius.*
Squirrel hake	See hake.	
Steelhead trout	Salmon trout	*Salmo gairdneri.*
Striped bass	Rockfish, rock	*Roccus lineatus.*
Sturgeon		Acipenser species.
Sturgeon, shovelnose		*Scaphirhynchus platorynchus.*
Sucker	Fresh-water mullet	Catostomidae species.
Sunfish	Bream, perch	Lepomis species.
		Centrarchidae species.
Surffishes	Perch	Embiotocidae species.
Swellfish	Puffer, swell toad, balloonfish, globefish.	*Spheroides maculatus.*
Swordfish		*Xiphias gladius.*
Tautog	Blackfish, oysterfish	*Tautoga onitis.*
Tenpounder	Elops	*Elops saurus.*
Thimble-eyed mackerel	Bullseye	*Scomber colias.*
Tilefish		*Lopholatilus chamæleonticeps.*
Tomcod		*Microgadus tomcod* (Atlantic coast).
		Microgadus proximus (Pacific coast).
Tripletail		*Lobotes surniamensis.*
Tullibees	See chubs.	
Tuna and tunalike fishes:		
Albacore	Longfin tuna	*Germo alalunga.*
Bluefin	Tuna, leaping tuna (Pacific coast)	*Thunnus saliens.*
	"Horse mackerel" (Atlantic coast)	*Thunnus thynnus.*
		Thunnus secundodorsalis.

Common and scientific names of the commercial fishery products caught in the United States and Alaska—Continued

Common name as shown in Bureau reports	Scientific names	Other common names
Tuna and tunalike fishes—Continued.		
Bonito		*Sarda sarda* (Atlantic coast). *Sarda chiliensis* (Pacific coast).
Skipjack	Striped tuna	*Euthynnus pelayms.*
Yellowfin		*Neothunnus macropterus.*
Turbot	Greenland halibut	*Reinhardtius hippoglossoides* (off New England.)
	American turbot, triggerfish	*Balistes carolinensis* (off Florida).
Wahoo		*Acanthocybium solandri.*
White bass	White lake bass	*Roccus chrysops.*
Whitebait	Small fry of several species.	
Whitefish:		
Common		*Coregonus clupeiformis* (Great Lakes). *Caulolatilus princeps* (Pacific coast).
Menominee		*Prosopium quadrilaterale.*
White perch		*Morone americana* (Atlantic coast).
Whiting	Silver hake	*Merluccius bilinearis.*
Wolffish		*Anarhichas lupus.*
Yellow perch		*Perca flavescens.*
Yellow pike	Wall-eyed pike, pike perch, dore	*Stizostedion vitreum.*
Yellowtail		*Ocyurus chrysurus* (Atlantic coast). *Seriola dorsalis* (Pacific coast).
Crabs:		
Hard	Hard-shell crab, blue crab	*Callinectes sapidus.*
	Dungeness crab	*Cancer magister* (Pacific coast).
	Rock crab, hard crab	*Cancer irroratus* (Atlantic coast).
Soft and peelers	Soft-shelled crab, blue crab	*Callinectes sapidus.*
King		*Paralithodes camtschatica* (Pacific coast).
King or horseshoe		*Limulus* (Atlantic coast).
Stone		*Menippi mercenaria.*
Crawfish:		
Fresh water	Crayfish	Cambarus species (Atlantic coast). Astacus species (Pacific coast).
Sea	Rock lobster, crayfish	*Panulirus argus* (Atlantic coast). *Panulirus interruptus* (Pacific coast).
Lobsters:		
Common		*Homarus americanus* (Atlantic coast).
Spiny	(See sea crawfish.)	
Shrimp		*Peneus setiferus.* *Peneus brasiliensis* (Atlantic and Gulf coasts). Pandalus species (Pacific coast). Pandalopsis species (Pacific coast). Crangon species (Pacific coast).
Abalone		Haliotis species.
Clams:		
Cockle		*Cardium corbis* (Pacific coast). *Saxidomus nuttall.*
Hard	Butter	*Tirela stultorum* (Pacific coast).
	Round clam, cherrystone, quahog, little neck	*Venus mercenaria* (Atlantic coast). *Venus mortoni* (Florida coast).
Pismo		*Tivela stultorum* (Pacific coast).
Razor		Ensis species (Atlantic coast). *Siliqua patula* (Pacific coast).
Soft	Soft shell clam, sand clam, nannynose, maninose.	Mya arenaria.
Surf	Skimmer	*Mactra solidissimo.*
Cockles	Moonshell	*Natica heros* (Atlantic coast).
Conchs		Strombus species. Busycon species.
Coquina	Pompano shells	*Donax variabilis.*
Mussels:		
Sea		*Mytilus californianus* (Pacific coast). *Mytilus edulis.*
Fresh water		Quadrula species. Lampsilis species. Unio species. Symphynota species.
Octopus		*Octopus punctatus* (Pacific coast).
Oysters:		
Eastern		*Ostrea virginica.*
Western	Olympia	*Ostrea lurida* (Pacific coast).
Japanese (introduced).	Pacific	*Ostrea gigas.*
Periwinkles		Littorina species.
Scallops:		
Bay		*Pecten irradians* (Atlantic coast). *Pecten aequisulcatus* (Pacific coast).
Sea		*Pecten magellanicus.*
Squid		*Loligo opalescens* (Pacific coast). *Loligo pealei* (Atlantic coast).

Common and scientific names of the commercial fishery products caught in the United States and Alaska—Continued

Common name as shown in Bureau reports	Scientific names	Other common names
Sea urchins		Echinoidea.
Terrapin	Diamond-back terrapin	Malaclemmys species.
Turtles:		
Green		*Chelonia mydas.*
Loggerhead		*Thalassochelys caretta.*
Hawksbill		*Chelonia inbricata.*
Snapping	Hard shell, alligator turtle	*Chelydra serpentina.* *Macrochalys lacertina.*
Soft shell		Trionyx species.
Frogs		Rana species.
Irish moss		*Chrondrus crispus.*
Kelp		Macrocystis species; Nereocystis species; Pelagophycus species; Alaria species.
Sponges:		
Glove		*Spongia graminea* (Hyatt) *Euspongia officianalis* (L.).
Grass		*Hippospongia equina cerebriformis.*
Sheepswool		*Hippospongia canaliculata gossypina.*
Yellow		*Hippospongia equina elastica.*
Trepang	Sea cucumber	*Cucumaris frondosa; Thyone briareus.*

U. S. DEPARTMENT OF COMMERCE
DANIEL C. ROPER, Secretary
BUREAU OF FISHERIES
FRANK T. BELL, Commissioner

Administrative Report No. 34

PROPAGATION AND DISTRIBUTION OF FOOD FISHES

FISCAL YEAR 1938

By GLEN C. LEACH, M. C. JAMES
and E. J. DOUGLASS

APPENDIX IV TO REPORT OF COMMISSIONER OF FISHERIES
FOR THE FISCAL YEAR 1938

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ADMINISTRATIVE REPORT SERIES

Since the advent of the Administrative Report Series, considerable confusion has arisen concerning its system of numbering the separates composing it. Inasmuch as the Reports of the Divisions vary in order from year to year, many have found their designations as "Appendix No. I, II, III, or IV" very confusing. To relieve this, it has been decided to number them as "Administrative Report No. —." Inasmuch as 20 separates had already been printed in this series before starting the numbers, it was deemed advisable to begin the numbering with Administrative Report No. 21. Of course, numbers cannot be printed on those already off the press, but for the information of those who wish to know what the first 20 were, they are numbered for filing purposes as follows:

No. 1. Report, Commissioner of Fisheries, 1931.
No. 2. Alaska Fishery and Fur-Seal Industries, 1930.
No. 3. Fishery Industries of the United States, 1930.
No. 4. Progress in Biological Inquiries, 1930.
No. 5. Propagation and Distribution of Food Fishes, 1931.
No. 6. Report Commissioner of Fisheries, 1932.
No. 7. Alaska Fishery and Fur-Seal Industries, 1931.
No. 8. Fishery Industries of the United States, 1931.
No. 9. Progress in Biological Inquiries, 1931.
No. 10. Propagation and Distribution of Food Fishes, 1932.
No. 11. Alaska Fishery and Fur-Seal Industries, 1932.
No. 12. Progress in Biological Inquiries, 1932.
No. 13. Fishery Industries of the United States, 1932.
No. 14. Propagation and Distribution of Food Fishes, 1933.
No. 15. Fishery Industries of the United States, 1933.
No. 16. Alaska Fishery and Fur-Seal Industries, 1933.
No. 17. Progress in Biological Inquiries, 1933.
No. 18. Propagation and Distribution of Food Fishes, 1934.
No. 19. Alaska Fishery and Fur-Seal Industries, 1934.
No. 20. Fishery Industries of the United States, 1934.

Note that the last Commissioner's Report was for 1932. Since then its place has been taken by a reprint from the Report of the Secretary of Commerce under the title "Bureau of Fisheries." Inasmuch as it is no longer a Bureau publication, it is not numbered; but it will be supplied to any who request the Report of the Commissioner for any year since 1932.

PROPAGATION AND DISTRIBUTION OF FOOD FISHES, FISCAL YEAR 1938 [1]

By GLEN C. LEACH, *Chief*, M. C. JAMES, *Assistant Chief*, and E. J. DOUGLASS, *Assistant Superintendent of Distribution, Division of Fish Culture*

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INTRODUCTION

The production of fish and eggs at Federal hatcheries during the fiscal year 1938 totaled 8,121,131,000. This was very close to the maximum production obtained in 1936 and was a moderate increase over the 1937 record. There are set forth elsewhere in this report the changes in methods and extension of facilities which contributed to this increase.

At no time since practical methods of artificial propagation of fish were developed has there been such a demand by the public for more and larger hatcheries. During this period there has been much critical analysis by biologists of the results obtained from fish-hatchery operations. These trends have resulted in a concerted effort to develop the most efficient and economical methods of conserving or increasing the fishery resources. Until such time as there is a clear-cut formula-

[1] Administrative Report No. 34. Appendix IV to the Report of the U. S. Commissioner of Fisheries for 1938. Approved for publication May 23, 1939.

tion of a precise program, it is necessary to view the hatcheries as an implement which has proved its effectiveness in a general way throughout a period of years.

Broadly speaking, the need for artificial propagation of fish increases as the artificial conditions of fish environment increase. For purposes of this discussion the outstanding element of artificiality may be considered as a concentrated pressure upon the fish stock by the increasing number of anglers or by more intensive commercial fishing. Hence, in many of the thickly populated States practically 100 percent of the take of game fish is of hatchery origin. Even in areas such as the national parks and national forests, there has been an equivalent concentration of angling even though the conditions of the waters themselves have remained virtually unchanged.

The popularization of recreation in many areas has been, in part, based upon an angling pressure far beyond the normal capacity of the streams and lakes to supply. Consequently, the normal, unimpaired productivity of such waters has had to be augmented by stocking.

The other elements of artificiality which have imposed a constantly increasing need for stocking are soil erosion, deforestation, pollution, and the introduction of structures alien to the natural watercourses, such as flood-control, hydroelectric, and storage dams.

The ultimate benefits to be derived from hatchery operations are as much dependent upon the intelligent use of their production as upon the efficiency with which the hatcheries are operated and the number of fish hatched and reared each season. Consequently, the most fertile field for improvement lies in a better control of stocking procedure.

An interesting aspect of hatchery activities lies in the vague distinction as between game and commercial species. It would be highly desirable if this report could show an analysis, for the benefit of both the sport fishermen and the commercial fishermen, of the production of these two classes of fish. We are at a loss, however, to draw any sharp line of distinction because of the fact that practically all varieties handled at the hatcheries are, under some conditions, sought by the anglers. Even the cod, haddock, flatfish, and pollock are the basis of sport-fishing activities carried on from party boats. It might be said that, out of the 48 species handled, only the lobster, whitefish, lake and glut herring, and two species of Pacific salmon, are completely ignored by sport fishermen. It has, therefore, been virtually impossible to analyze the records of hatchery production so as to show the actual contribution to that portion of the public which fishes for recreation, and to the much smaller group which fishes for a livelihood.

SPECIES PROPAGATED

During the year 1938 there were 48 separate species handled at Federal hatcheries, in comparison with 46 species during the previous year. These include the most important game and panfishes, which are foremost in the angler's mind, as well as a number of commercial fish which are most amenable to artificial propagation. Pink, or humpback salmon were propagated for the first time since 1934. Due to unfavorable conditions at the Woods Hole, Mass., station no mackerel eggs were collected this season. With the cooperation of the Montana Fish and Game Department, this Bureau was able to

secure a limited number of landlocked sockeye salmon eggs for hatching.

The following list gives the common and scientific designation of the species propagated.

Catfishes (*Siluridae*):
- Catfish (*Leptops olivaris*).
- Spotted channel catfish (*Ictalurus punctatus*).
- Bullhead (*Ameiurus nebulosus*).

Carp (*Cyprinidae*): Common carp (*Cyprinus carpio*).
Buffalofish (*Catostomidae*): Common buffaloes (*Ictiobus* sp.).
Shad and herring (*Clupeidae*):
- Shad (*Alosa sapidissima*).
- Glut herring (*Pomolobus aestivalis*).

Salmons, trouts, and whitefishes (*Salmonidae*):
- Common whitefish (*Coregonus clupeaformis*).
- Lake herring, cisco (*Leucichthys* sp.).
- Chinook, king, or quinnat salmon (*Oncorhynchus tschawytscha*).
- Chum salmon (*Oncorhynchus keta*).
- Coho salmon, silver salmon (*Oncorhynchus kisutch*).
- Red salmon, sockeye, or blueback salmon (*Oncorhynchus nerka*).
- Pink or humpback salmon (*Oncorhynchus gorbuscha*).
- Landlocked sockeye salmon, silver trout (*Oncorhynchus kennerlyi*).
- Steelhead trout (*Salmo gairdnerii*).
- Atlantic salmon (*Salmo salar*).
- Landlocked salmon (*Salmo sebago*).
- Rainbow trout (*Salmo irideus*).
- Black-spotted trout, redthroat trout (*Salmo lewisi*).
- Brown or Loch Leven trout (*Salmo fario var.*).
- Lake trout, mackinaw trout (*Cristivomer namaycush*).
- Brook trout (*Salvelinus fontinalis*).
- Golden trout (*Salmo agua-bonita*).

Grayling (*Thymallidae*): Montana grayling (*Thymallus montanus*).
Pikes (Esocidae): Pike and pickerel (*Esox* sp.).
Sunfishes (*Centrarchidae*):
- Crappie (*Pomoxis annularis* and *P. sparoides*).
- Largemouth black bass (*Micropterus salmoides*).
- Smallmouth black bass (*Micropterus dolomieu*).
- Rock bass (*Ambloplites rupestris*).
- Warmouth bass (*Chaenobryttus gulosus*).
- Bluegill sunfish (*Lepomis incisor*).
- Green sunfish (*Lepomis cyanellus*).
- Redbreasted bream (*Lepomis auritus*).
- Red-eared sunfish (*Lepomis heros*).
- Common sunfish (*Lepomis gibbosus*).

Mojarras de rio (*Cichlidae*).
- Rio Grande perch (*Herichthys cyanoguttatus*).

Perches (*Percidae*):
- Pike perch (*Stizostedion vitreum*).
- Yellow perch, ringed perch (*Perca flavescens*).

White basses (*Serranidae*):
- White bass (*Roccus chrysops*).
- Striped bass (*Roccus saxatilis*).
- White perch (*Morone americana*).

Drums (*Sciaenidae*): Fresh-water drum, lake sheepshead (*Aplodinotus grunniens*).
Cods (*Gadidae*):
- Cod (*Gadus callarias*).
- Haddock (*Melanogrammus aeglefinus*).
- Pollock (*Pollachius virens*).

Flounders (*Pleuronectidae*): Winter flounder (*Pseudopleuronectes americanus*).
Lobster (*Homaridae*): Lobster (*Homarus americanus*).

Summary, by species, of the output of fish and fish eggs during the fiscal year ending June 30, 1938

Species	Eggs	Fry	Fingerlings	Total
Catfish			28, 468, 960	28, 468, 960
Buffalofish	387, 445, 000		3, 211, 300	390, 656, 300
Carp	329, 200, 000		2, 714, 200	331, 914, 200
Shad		26, 140, 940		26, 140, 940
Whitefish	480, 000	74, 550, 000		75, 030, 000
Lake herring		1, 400, 000		1, 400, 000
Glut herring		1, 370, 000		1, 370, 000
Striped bass		415, 000		415, 000
Chinook salmon	3, 005, 000	22, 608, 150	14, 065, 565	39, 678, 715
Chum salmon	5, 070, 000	6, 370, 390		11, 440, 390
Silver salmon		450, 050	492, 370	942, 420
Humpback salmon		4, 584, 000		4, 584, 000
Sockeye salmon	100, 000		2, 929, 505	3, 029, 505
Sockeye salmon (landlocked)			401, 200	401, 200
Atlantic salmon			70, 500	70, 500
Landlocked salmon			48, 245	48, 245
Steelhead trout	141, 000		1, 498, 615	1, 639, 615
Rainbow trout	9, 242, 140	169, 100	9, 105, 970	18, 517, 210
Black-spotted trout	23, 873, 940	2, 719, 620	15, 033, 450	41, 627, 010
Loch Leven trout			2, 128, 835	2, 128, 835
Lake trout	216, 320	1, 163, 000	135, 500	1, 514, 820
Brook trout	18, 866, 050	1, 647, 000	14, 577, 340	35, 090, 390
Golden trout			255	255
Grayling	2, 785, 300	3, 364, 700	75, 345	6, 225, 345
Pike and pickerel			48, 265	48, 265
Crappie			7, 091, 745	7, 091, 745
Black bass, largemouth		1, 431, 800	6, 504, 410	7, 936, 210
Black bass, smallmouth		1, 399, 000	325, 625	1, 724, 625
Rock bass			116, 080	116, 080
Warmouth bass			64, 140	64, 140
Sunfish			9, 457, 050	9, 457, 050
Pike perch			137, 520, 000	137, 520, 000
Yellow perch		329, 475, 000	159, 805	329, 634, 805
Fresh-water drum			435	435
White bass			45, 895	45, 895
White perch		4, 480, 000	850	4, 480, 850
Miscellaneous fishes			412, 350	412, 350
Cod	2, 174, 601, 000	152, 465, 100		2, 327, 066, 100
Haddock	924, 933, 000	39, 287, 000		964, 220, 000
Flatfish	270, 670, 200	1, 010, 624, 000		1, 281, 294, 200
Pollock	1, 761, 951, 000	257, 399, 000		2, 019, 350, 000
Lobster		8, 334, 480		8, 334, 480
Total	5, 912, 579, 950	2, 089, 367, 330	119, 184, 705	8, 121, 131, 985

PRODUCTION

Inasmuch as the total output of eggs and fish varied but slightly from the figure for the previous year, there was relatively little difference in the comparable production of the individual species. The trend of increase in the production of marine commercial species of New England—cod, haddock, pollock, and lobster—has continued.

Other commercial species handled in increased numbers were the shad, lake herring, and buffalofish. The output of all species of Pacific salmon was at a lower level, which accounted, in part, for a reduction in the distribution of fish of the fingerling size. There was a slight increase in the distribution of steelhead trout, so popular on the Pacific coast.

The production of largemouth and smallmouth bass, approaching 70 million fish, exceeded all previous records for these species. The aggregate number of trout and trout eggs, which contributed to the development of good angling, was 99 million. Grouping the so-called "panfishes" with the strictly game varieties, there was a total production of 131½ million fish of a noncommercial type.

While this report emphasizes the number of fish and eggs produced, there has been an unremitting effort to maintain the existing high quality of stock.

CONSTRUCTION ACTIVITIES

Major construction activities were concerned with the establishment of four new hatcheries, as authorized by the act of May 21, 1930. The 1938 appropriations act carried an item of $155,000 for this purpose. The new hatcheries were, by law, allocated to the States of Florida, Nevada, Georgia, and Mississippi. After a careful preliminary survey the Secretary of Commerce approved locations at Marianna, Fla., Las Vegas, Nev., Cohutta, Ga., and Lyman, Miss.

The delay incident to acquiring title to the sites deferred the starting of actual construction until late in the year and none of the establishments were completed at the close of the year. However, a limited number of fish were produced at Lyman, Miss. The Nevada project consisted of a small hatchery which had been previously operated by the city of Las Vegas. This was donated to the Bureau and a program of enlargement and improvement was undertaken. One other site was also acquired by donation. All hatcheries were developed to the point where they were in readiness for some fish production during the fiscal year 1939. All of these hatcheries will produce warm-water species.

At Carson, Wash., the development of a trout and salmon hatchery, started in the fiscal year 1938, was continued until the exhaustion of available funds. A hatchery, service buildings, water-supply system, and several dwellings for personnel were provided, leaving a further need for rearing ponds.

During the year the Farm Security Administration transferred to the Bureau of Fisheries a site at Arcadia, R. I., for development as a bass hatchery. Preliminary development work on a cooperative basis with the Farm Security Administration was undertaken, but the major part of the construction remained to be done during the succeeding fiscal year.

Some repairs and improvements at the older hatcheries were effected by the setting up of local W. P. A. projects. The most important of these were for the complete rehabilitation of the Hartsville, Mass., and the White Sulphur Springs, W. Va., stations. By the utilization of funds from the regular appropriations as a sponsor's contribution, it is possible to carry out extensive improvements under such procedure.

At the close of the fiscal year there had been approved an allocation of $808,500 from the Public Works Administration, and $500,050 from the Works Progress Administration. These amounts, which were to be disbursed by the Bureau, covered a broad program of improvement and enlargement at practically all of the hatcheries, the purpose being to put all of the properties in the best possible physical condition and thus add materially to their operating efficiency. No work had started on these projects at the close of the fiscal year.

COOPERATION WITH OTHER CONSERVATION AGENCIES

Among the administrative procedures most valuable in conducting the Federal fish-cultural activities may be listed the cooperative relations existing with other agencies working in the same field. No other Federal agency has the responsibility of operating hatcheries, but numerous bureaus of the Federal Government administer lands and waters which receive the output of the hatcheries maintained by this Bureau.

Such agencies as the Forest Service, National Park Service, Bureau of Reclamation, Office of Indian Affairs, and various other land-administering units, have encountered problems in fish management and stocking in areas under their control.

Whether or not formal agreements of cooperation, such as have been drawn up with the Forest Service and the Tennessee Valley Authority, have been put into effect, the Bureau has contributed to the solution of these problems. The Division of Fish Culture assisted the T. V. A. in the preparation of plans for a large hatchery on the Elk River in Alabama and at the close of the year construction opertions were being started. Upon completion, this unit is to be operated by this Bureau.

In the Chattahoochee National Forest a very complete trout-rearing unit was constructed by the Forest Service and turned over to the Bureau of Fisheries for operation. Several similar establishments are operated in other national forests, generally on a seasonal basis. In the general distribution from regular hatcheries special attention has been given to the requirements of the Forest Service.

Late in the fiscal year the Forest Park Hatchery, located in the municipal park system of the city of St. Louis, was abandoned by the State Conservation Department due to insufficient funds for its operation. The Bureau was requested to take it over temporarily under agreement with the city. An experienced fish culturist was assigned to take charge and a successful hatching season resulted, although the greater part of the fingerling bass, panfish, and other species were retained for later distribution. The Bureau has also maintained a man at a State hatchery located at Palestine, W. Va. Lobster culture at the Bureau's Gloucester, Mass., station was conducted in cooperation with the State Division of Marine Fisheries and plans are being developed for a comparable effort in lobster culture jointly with the State of Maine.

The Bureau prepared plans for the development of a bass hatchery at Inks Dam, Tex., on the lower Colorado River. The site was made available by the Lower Colorado River Authority, with the labor to be furnished by the National Youth Administration. Active development work was starting at the close of the year, with the intent that the establishment would be operated by the Bureau upon completion.

A similar establishment was in process of construction at Elephant Butte Dam, N. Mex., the sponsoring agency being the Bureau of Reclamation, with labor furnished by the Civilian Conservation Corps.

As heretofore, the closest contact with the State fish and game departments has been in the distribution of the hatchery output and in the exchange of eggs. The fact that, as a general rule, the public recognizes no distinction between State and Federal hatcheries and their activities, is indicative of the high degree of unity which has been achieved.

The Bureau's contacts with private and semipublic sportsmen's and conservation organizations have been largely in the nature of direct services. Such organizations have been recipients of large numbers of fish for stocking and have been furnished with technical advice when needed. As an example, there may be cited the hatchery development at Carpenters Brook, Onondaga County, N. Y. Local sportsmen enlisted the aid of the county authorities and county funds

were used as a sponsor's contribution for the setting up of a W. P. A. project. This is resulting in the establishment of a first-class trout and bass hatchery, for which the Bureau is supplying eggs and fish, as well as technical operating guidance. The existing establishment at Rochester, N. Y., has served as a successful model for the newer project.

Field employees of the Division of Fish Culture have been inculcated with a will to cooperate and this attitude has been largely reciprocated. An exhaustive itemization of all phases in which coordination has resulted in efficiency and economy would be too extensive for treatment in this report.

SALVAGE OPERATIONS

Rescue crews were sent into the field at five different points within the territory of the Upper Mississippi Wild Life Refuge for the purpose of salvaging fish stranded in sloughs. In handling 43,194,485 fish the collections were approaching the normal average of preceding years, although the scope of the work is being progressively reduced by the development of the area for navigation. Approximately 1.2 percent of the fish rescued were utilized for general distribution, the remainder being returned directly to the Mississippi River. The requirements for distribution in interior waters were largely met from the production of propagating ponds of a semiartificial nature.

Several carloads of the rescued fish were assigned to the State of North Dakota for the purpose of stocking new lakes and reservoirs. The State defrayed the transportation charges. As the character of the Upper Mississippi Wild Life Refuge has changed through improvement of navigation facilities, there has been corresponding change in the fisheries' administrative problems. The period of survey and salvage activities has largely passed, and future work will be directed toward the development of propagating ponds, several of which can be advantageously located immediately below the navigation dams.

Number and disposition of fish rescued, fiscal year 1938

Locality and species	Delivered to applicants	Restored to original waters	Total number of fish
All stations:			
Black bass	136,235	318,025	454,260
Crappie	141,310	6,104,450	6,245,760
Sunfish	185,245	3,885,350	4,070,595
Catfish	52,620	25,594,220	25,646,840
Yellow perch	4,925	77,560	82,485
Pike-pickerel		45,265	45,265
Carp		2,708,900	2,708,900
Buffalofish		3,155,700	3,155,700
White bass		77,895	77,895
Drum		435	435
Miscellaneous fishes		706,350	706,350
Total	520,335	42,674,150	43,194,485
Summary by stations:			
Marquette, Iowa	325,865	25,006,450	25,332,315
Bellevue, Iowa	20,880	9,384,555	9,405,435
La Crosse, Wis. (Genoa)	27,250		27,250
Fairport, Iowa		992,720	992,720
Lynxville, Wis	78,415	6,968,850	7,047,265
Homer, Minn	67,925	321,575	389,500
Total	520,335	42,674,150	43,194,485

ASSIGNMENTS OF FISH AND FISH EGGS TO STATES, TERRITORIES, AND FOREIGN COUNTRIES

Six foreign countries and the Territory of Puerto Rico were the recipients of fish or fish eggs produced at Bureau hatcheries. Each year there are requests for the acclimatization of American food and game fishes in foreign countries. A number of the shipments referred to in table 3 were in continuation of programs previously started. The Bureau has for several years supplied raw material in the form of fish eggs or fingerling fish for the hatchery operated by the Puerto Rican Department of Agriculture. Rainbow eggs shipped to Venezuela were to augment a previous consignment from which a large part of the fish were lost after their successful hatching in Venezuela.

It will be noted that the rainbow trout was the most popular species, due to the hardiness and adaptability of this member of the trout family.

Both the Mexican and Argentine Governments now operate their own hatchery facilities and the egg shipments made by the Bureau were as a measure of cooperation with these countries. Lake-trout eggs were shipped to Switzerland a number of years ago and their successful development in certain Alpine lakes prompted the Swiss Government to request a further consignment. The assignment of one-half million brook-trout eggs to Canada was on an exchange basis, since the Bureau was the recipient of an equal number of lake-trout eggs in compensation.

The problems attending foreign shipments of eggs and fish, particularly to distant points, are many, but it is believed, particularly in the case of the American republics, that the special effort required is justified as a step toward better international understanding.

Assignments of fish and fish eggs to State fish commissions, fiscal year 1938

States and species	Eggs	Fry	Fingerlings, etc.	Total
Alabama:				
Black bass, largemouth			6,475	6,475
Sunfish			214,130	214,130
Arizona:				
Black-spotted trout	500,000			500,000
Steelhead trout	15,000			15,000
Black bass			33,000	33,000
Sunfish			17,000	17,000
Catfish			2,300	2,300
Arizona:				
Black bass, largemouth			22,000	22,000
Black bass, smallmouth		70,000		70,000
Sunfish			73,500	73,500
California: Chum salmon	200,000			200,000
Connecticut:				
Rainbow trout	50,000			50,000
Black bass, smallmouth		416,000		416,000
Georgia:				
Brook trout	25,000			25,000
Rainbow trout	275,000			275,000
Black bass, largemouth			1,000	1,000
Illinois:				
Black bass, largemouth			16,000	16,000
Rock bass			4,000	4,000
Sunfish			20,000	20,000
Idaho:				
Black-spotted trout	500,000		55,000	555,000
Rainbow trout			209,200	209,200
Brook trout			15,000	15,000
Grayling	500,300			500,300

Assignments of fish and fish eggs to State fish commissions, fiscal year 1938—Contd.

States and species	Eggs	Fry	Fingerlings, etc.	Total
Indiana:				
Brook trout			58,275	58,275
Loch Leven trout			8,000	8,000
Rainbow trout			45,675	45,675
Black bass, largemouth			10,250	10,250
Black bass, smallmouth			16,650	16,650
Sunfish			54,125	54,125
Crappie			1,235	1,235
Iowa:				
Brook trout	10,000		18,000	28,000
Loch Leven trout			3,000	3,000
Rainbow trout	66,000			66,000
Black bass, largemouth			22,880	22,880
Sunfish			4,000	4,000
Kentucky: Black bass, smallmouth		96,000	500	96,500
Maryland:				
Black bass, largemouth			22,900	22,900
Sunfish			4,500	4,500
Crappie			2,400	2,400
Yellow perch		844,000		844,000
Massachusetts:				
Brook trout			40,000	40,000
Rainbow trout	175,000			175,000
Michigan:				
Brook trout			125	125
Rainbow trout	401,100			401,100
Minnesota: Black bass, largemouth			108,000	108,000
Mississippi: Sunfish			6,200	6,200
Missouri: Black bass, smallmouth		145,000		145,000
Montana:				
Black-spotted trout	3,112,900			3,112,900
Brook trout			71,000	71,000
Grayling			23,130	23,130
Black bass, largemouth			38,060	38,060
Sunfish			325	325
Catfish			54,295	54,295
Crappie			17,750	17,750
Nevada: Rainbow trout	400,720			400,720
New Hampshire: Brook trout	1,700,000		100,000	1,800,000
New Mexico:				
Black-spotted trout	1,500,000			1,500,000
Catfish			1,300	1,300
Crappie			700	700
Black bass, largemouth			343,000	343,000
Chum salmon	400,000			400,000
New York:				
Lake trout	51,000			51,000
Rainbow trout			2,500	2,500
North Carolina:				
Brook trout			89,950	89,950
Rainbow trout	100,000			100,000
Sunfish			36,150	36,150
North Dakota:				
Black bass, largemouth			28,175	28,175
Sunfish			19,510	19,510
Crappie			26,375	26,375
Oklahoma: Black bass, largemouth			5,000	5,000
Oregon:				
Black-spotted trout	2,000,000			2,000,000
Steelhead trout			305,000	305,000
Chinook salmon			78,000	78,000
Chum salmon	800,000			800,000
Silver salmon			54,000	54,000
Grayling	250,100			250,100
Rhode Island:				
Brook trout	100,000			100,000
Flounder		68,272,000		68,272,000
South Carolina:				
Rainbow trout	165,000			165,000
Black bass, largemouth			9,200	9,200
Sunfish			300	300
South Dakota:				
Rainbow trout			36,000	36,000
Black bass, largemouth			20,180	20,180
Sunfish			20,700	20,700
Catfish			10,700	10,700
Crappie			15,200	15,200
Tennessee: Rainbow trout	75,000			75,000
Utah:				
Chum salmon	500,000			500,000
Grayling	1,300,000			1,300,000

Assignments of fish and fish eggs to State fish commissions, fiscal year 1938—Contd.

States and species	Eggs	Fry	Fingerlings, etc.	Total
Vermont:				
Brook trout	1,500,000			1,500,000
Loch Leven trout			1,800	1,800
Rainbow trout			7,830	7,830
Black bass, smallmouth		30,000		30,000
Virginia: Rainbow trout			253,000	253,000
Washington:				
Black-spotted trout	700,000			700,000
Brook trout			17,000	17,000
Rainbow trout			58,500	58,500
West Virginia:				
Brook trout			659,125	659,125
Loch Leven trout			78,500	78,500
Rainbow trout			412,000	412,000
Black bass, largemouth			12,500	12,500
Black bass, smallmouth			10,000	10,000
Wisconsin: Rainbow trout	50,000			50,000
Wyoming:				
Black-spotted trout	1,600,000			1,600,000
Brook trout			17,400	17,400
Lake trout	52,820			52,820
Rainbow trout			12,900	12,900
Total	19,074,940	69,873,000	4,062,375	93,010,315

The Bureau has been able to assign eggs, fry, and fish to several of the States. By such arrangement the activities of the State hatcheries are greatly benefited. Many of the assignments shown in the table above were not, of course, outright donations, but were transfers which made it possible for Bureau applications to be filled from State hatcheries, and the cost of distribution was thereby reduced.

The comparatively large assignments of rainbow-trout eggs, fingerlings, etc., were due to the fact that the Bureau is the principal source of supply of eggs from the fall-spawning strain. These eggs are in great demand because of the fact that their early hatching results in much larger fish for distribution during the spring months.

The total number of our assignments was somewhat below the record of the previous year, due, among other reasons, to the failure of our supply of Loch Leven trout eggs.

Shipments of fish and fish eggs to foreign countries, fiscal year 1938

Countries and species	Eggs	Fingerlings, etc.	Total
Puerto Rico:			
Bream		600	600
Catfish		975	975
Rainbow trout	250,000		250,000
Venezuela: Rainbow trout	100,000		100,000
Trinidad: Rainbow trout	35,000		35,000
Switzerland: Lake trout	75,000		75,000
Mexico: Rainbow trout	218,000		218,000
Argentina: Rainbow trout	105,000		105,000
Canada: Brook trout	500,000		500,000
Total	1,283,000	1,575	1,284,575

TRANSFER OF EGGS BETWEEN STATIONS

As equipment is transferred between the various units of the Bureau's hatchery system for the purpose of more effective utilization, so are surplus eggs of one hatchery shipped for incubation at

other points. Natural conditions favor the production of eggs of certain species of trout at certain hatcheries, and economy requires that these favoring circumstances be taken advantage of. Such shifting of the egg supply is also considered a measure of distribution, since eggs can be shipped for a long distance quite economically, whereas the transportation of fish of a stocking size might represent an expenditure of hundreds of dollars.

Transfer of eggs between stations, fiscal year 1938

Species	Number of eggs	From—	To—
Black-spotted trout	100,170	Saratoga, Wyo	Springville, Utah.
	1,850,000	Yellowstone Park, Wyo	Bozeman, Mont.
	2,100,000	do	Springville, Utah.
	800,000	do	Leadville, Colo.
	200,000	do	Hagerman, Idaho.
	400,000	do	Ennis, Mont.
	50,000	do	Spearfish, S. Dak.
	100,000	do	Clackamas, Oreg.
	600,000	do	Birdsview, Wash.
	400,000	do	Saratoga, Wyo.
	1,364,000	do	Jackson, Wyo.
	150,000	do	Eagle Nest, N. Mex.
	1,400,000	do	Glacier Park, Mont.
	200,000	do	Mount Rainier, Wash.
	200,000	do	Quilcene, Wash.
	800,000	do	Quinault, Wash.
	100,000	do	Spokane, Wash.
	100,000	do	Salmon, Idaho.
Brook trout	500,000	Craig Brook, Maine	Cape Vincent, N. Y.
	200,000	do	Erwin, Tenn.
	350,000	do	White Sulphur Springs, W. Va.
	250,000	do	Smokemont, N. C.
	250,000	do	Hartsville, Mass.
	400,000	do	Wytheville, Va.
	78,000	do	Northville, Mich.
	700,000	Leadville, Colo	Saratoga, Wyo.
	200,000	do	Manchester, Iowa.
	300,000	do	Springville, Utah.
	100,000	do	Clackamas, Oreg.
	101,000	do	Crawford, Nebr.
	75,000	do	Duluth, Minn.
	65,000	do	Eagle Nest, N. Mex.
	300,000	Creede, Colo	Spearfish, S. Dak.
	204,000	do	Bear Lake, Utah.
	400,000	do	Northville, Mich.
	300,000	do	Bozeman, Mont.
	369,000	do	Crawford, Nebr.
	656,000	do	Springville, Utah.
	502,000	do	La Crosse, Wis.
	229,000	do	Duluth, Minn.
	500,000	National Forest of New Hampshire.	Wytheville, Va.
	515,000	do	Nashua, N. H.
	300,000	do	Cape Vincent, N. Y.
	792,000	do	White Sulphur Springs, W. Va.
	300,000	do	Duluth, Minn.
	400,000	do	La Crosse, Wis.
	608,000	do	Leetown, W. Va.
	1,541,850	do	St. Johnsbury, Vt.
	10,000	do	Lake Mills, Wis.
	200,000	do	Northville, Mich.
	100,000	do	Manchester, Iowa.
	100,000	do	Craig Brook, Maine.
	500,000	do	Erwin, Tenn.
	500,000	do	Walhalla, S. C.
	200,000	do	Cortland, N. Y.
	200,000	do	Barneveld, N. Y.
Rainbow trout	100,000	Hagerman, Idaho	Saratoga, Wyo.
	100,000	do	Springville, Utah.
	287,900	Eagle Nest, N. Mex	Leadville, Colo.
	333,200	Neosho, Mo	Creede, Colo.
	523,400	do	Bozeman, Mont.
	715,500	do	Saratoga, Wyo.
	294,000	do	Crawford, Nebr.

Transfer of eggs between stations, fiscal year 1938—Continued

Species	Number of eggs	From—	To—
Rainbow trout—Continued.	50,000	Springville, Utah	Birdsview, Wash.
	100,000	do	Quinault, Wash.
	100,000	do	Bear Lake, Utah.
	300,000	do	Spokane, Wash.
	300,000	do	Carson, Wash.
	50,000	White Sulphur Springs, W. Va.	Hartsville, Mass.
	505,000	do	Walhalla, S. C.
	50,000	do	Nashua, N. H.
	30,000	do	Smokemont, N. C.
	50,000	do	Craig Brook, Maine.
	175,000	Wytheville, Va	Cortland, N. Y.
	450,000	do	Smokemont, N. C.
	150,000	do	Barneveld, N. Y.
	229,900	Yellowstone Park, Wyo	Ennis, Mont.
	250,000	do	Glacier Park, Mont.
Steelhead trout	20,000	Birdsview, Wash	Berlin, N. H.
	31,000	do	Salmon, Idaho.
Lake trout	30,000	Cape Vincent, N. Y	Cortland, N. Y.
	37,000	do	Craig Brook, Maine.
Grayling	500,000	Yellowstone Park, Wyo	Springville, Utah.
	500,000	do	Ennis, Mont.
	250,100	do	Bozeman, Mont.
Chum salmon	200,000	Quinault, Wash	Birdsview, Wash.

STATION OUTPUT

There has been a continuation of the development of new fish-cultural facilities, and the 1938 output was obtained from a total of 49 main stations and 43 substations. Among the units which contributed for the first time to the distribution listing were the establishments at Carson, Wash.; Elephant Butte, N. Mex.; and Forest Park, St. Louis, Mo. The Pisgah Forest, N. C., station, which is a fully equipped rearing unit, also entered into production for the first time. The output of the Rochester, N. Y., cooperative establishment is likewise listed because of the fact that the Bureau is responsible for the operations of this establishment.

The San Angelo, Tex., station produced 102,000 pondfish in its first season's activity. The Walhalla, S. C., station did not hatch any trout but, from fingerlings transferred there for rearing, a distribution of 77,000 fish was obtained. Although the Bureau took over the Welaka, Fla., station virtually at the onset of the spawning season, it was, nevertheless, possible to achieve a distribution of 300,000 largemouth bass before the close of the year.

Fish-cultural work was discontinued at Lakeland, Vt., where formerly pike perch and yellow perch had been propagated in cooperation with the State of Vermont.

The Bureau has followed the practice of listing as distributed all fish which were transferred from its hatcheries to rearing units operated by private organizations or by States. When fish have been transferred to the Forest Service rearing projects, where the Bureau maintains a measure of supervision and actively participates in the distribution, the production figures are those which cover the actual number of large fingerlings planted at the close of the rearing season. It has been found impracticable to attempt to follow through to the ultimate stocking performed from rearing projects which are supervised by agencies other than the Bureau.

It is timely to repeat a statement which has appeared in previous Divisional reports relative to the distribution of carp. All carp eggs

which the Bureau's hatcheries handle are secured in sections where there is an active commercial fishery for this species and they are not distributed elsewhere.

Stations and substations operated and the output of each, fiscal year 1938

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
Birdsview, Wash.:				
Black-spotted trout			296,000	296,000
Brook trout			326,500	326,500
Rainbow trout			75,650	75,650
Chinook salmon			102,000	102,000
Humpback salmon		3,864,000		3,864,000
Silver salmon		44,000	222,000	266,000
Sockeye salmon	100,000		326,200	426,200
Steelhead trout	141,000		665,000	806,000
Mt. Rainier, Wash.:				
Black-spotted trout			317,000	317,000
Brook trout			337,665	337,665
Golden trout			255	255
Rainbow trout			109,590	109,590
Steelhead trout			72,000	72,000
Spokane, Wash.:				
Black-spotted trout			30,000	30,000
Brook trout			35,000	35,000
Rainbow trout			98,400	98,400
Boothbay Harbor, Maine:				
Cod	573,913,000			573,913,000
Flatfish		534,600,000		534,600,000
Haddock	135,290,000			135,290,000
Lobster		7,151,150		7,151,150
Bozeman, Mont.:				
Black-spotted trout	15,000		2,979,825	2,994,825
Brook trout			484,865	484,865
Loch Leven trout			17,250	17,250
Rainbow trout			440,550	440,550
Grayling		6,000	57,985	63,985
Ennis, Mont.:				
Black-spotted trout		531,800	455,675	987,475
Loch Leven trout			827,640	827,640
Rainbow trout			994,325	994,325
Grayling		496,200	7,360	503,560
Glacier Park, Mont.:				
Black-spotted trout		1,454,820	402,980	1,857,800
Rainbow trout		169,100		169,100
Miles City, Mont.:				
Black bass, largemouth			118,290	118,290
Sunfish			2,905	2,905
Catfish			85,735	85,735
Crappie			42,975	42,975
Cape Vincent, N. Y.:				
Brook trout			17,000	17,000
Lake trout	163,500	553,000		716,500
Landlocked salmon			8,000	8,000
Black bass, smallmouth			36,035	36,035
Barneveld, N. Y.:				
Brook trout			210,970	210,970
Lake trout			2,000	2,000
Loch Leven trout			47,500	47,500
Rainbow trout			56,100	56,100
Cortland, N. Y.:				
Brook trout			174,710	174,710
Lake trout			9,960	9,960
Loch Leven trout			52,360	52,360
Rainbow trout			84,930	84,930
Watertown, N. Y.:				
Brook trout			409,500	409,500
Lake trout			10,000	10,000
Loch Leven trout			36,200	36,200
Rainbow trout			2,200	2,200
Carson, Wash.:				
Chinook salmon		2,750,000	208,675	2,958,675
Little White Salmon, Wash.:				
Chinook salmon	3,000,000	5,376,000		8,376,000
Big White Salmon, Wash.:				
Chinook salmon	5,000	4,570,000	4,412,000	8,987,000
Clackamas, Oreg.:				
Brook trout			213,000	213,000
Chinook salmon			904,110	904,110
Silver salmon			103,370	103,370
Battle Creek, Calif.:				
Chinook salmon		980,000	6,618,575	7,598,575

NOTE.—Stations italicized are substations of the preceding station in roman type.

Stations and substations operated and the output of each, fiscal year 1938—Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
Mill Creek, Calif.:				
Chinook salmon		8,932,150		8,932,150
Butte Falls, Oreg.:				
Steelhead trout			305,000	305,000
Chinook salmon			1,408,000	1,408,000
Silver salmon			54,000	54,000
Craig Brook, Maine:				
Brook trout	2,028,000		283,805	2,311,805
Rainbow trout			21,000	21,000
Atlantic salmon			70,500	70,500
Crawford, Nebr.:				
Black-spotted trout			397,500	397,500
Brook trout			285,700	285,700
Loch Leven trout			49,000	49,000
Rainbow trout			376,995	376,995
Yellow perch			10,000	10,000
Black bass, largemouth			111,100	111,100
Rock bass			3,300	3,300
Sunfish			27,150	27,150
Catfish			106,275	106,275
Crappie			28,900	28,900
Dexter, N. Mex.:				
Black bass, largemouth			1,016,800	1,016,800
Sunfish			223,400	223,400
Catfish			25,490	25,490
Crappie			11,450	11,450
Santa Rosa, N. Mex.:				
Black bass, largemouth			64,000	64,000
Sunfish			61,000	61,000
Catfish			2,000	2,000
Duluth, Minn.:				
Brook trout			240,000	240,000
Lake trout	52,820	610,000	12,000	674,820
Loch Leven trout			71,750	71,750
Rainbow trout			7,500	7,500
Pike perch		33,690,000		33,690,000
Lake herring		1,400,000		1,400,000
Whitefish		3,750,000		3,750,000
Edenton, N. C.:				
Black bass, largemouth		54,450	19,630	74,080
Sunfish			38,545	38,545
Catfish			200	200
Crappie			1,525	1,525
Glut herring		1,370,000		1,370,000
Shad		7,085,000		7,085,000
White perch		4,480,000		4,480,000
Weldon, N. C.:				
Striped bass		415,000		415,000
Elephant Butte, N. Mex.:				
Black bass, largemouth			118,000	118,000
Sunfish			22,000	22,000
Erwin, Tenn.:				
Brook trout			565,925	565,925
Rainbow trout			220,365	220,365
Black bass, largemouth		109,300	317,910	427,210
Black bass, smallmouth			850	850
Rock bass			4,200	4,200
Sunfish			28,100	28,100
Fairport, Iowa:				
Black bass, largemouth		59,000	109,680	168,680
Black bass, smallmouth			8,980	8,980
White bass			880	880
Sunfish			227,005	227,005
Catfish			20,000	20,000
Crappie			258,420	258,420
Buffalofish	43,332,500		444,400	43,776,900
Carp	37,200,000		181,000	37,381,000
Drum			235	235
Pike and pickerel			180	180
Miscellaneous fishes			22,350	22,350
Flintville, Tenn.:				
Rainbow trout			136,000	136,000
Black bass, largemouth			250	250
Black bass, smallmouth			5,650	5,650
Rock bass			15,600	15,600
Sunfish			44,800	44,800
Fort Belvoir, Va.:				
Yellow perch		329,475,000	200	329,475,200
Black bass, largemouth			2,590	2,590
Sunfish			18,025	18,025
Catfish			645	645
Crappie			745	745
Shad		15,000,000		15,000,000
White perch			850	850

Stations and substations operated and the output of each, fiscal year 1938—Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
Gloucester, Mass.:				
Cod	1,600,687,960	152,465,100		1,753,153,060
Flatfish	270,670,200	23,361,000		294,031,200
Haddock	789,643,000	39,287,000		828,930,000
Lobster		1,183,330		1,183,330
Pollock	1,761,951,000	257,399,000		2,019,350,000
Hagerman, Idaho:				
Brook trout			200,500	200,500
Black-spotted trout			242,000	242,000
Rainbow trout	200,000		721,100	921,100
Salmon, Idaho:				
Black-spotted trout			326,450	326,450
Rainbow trout	50,000		594,160	644,160
Steelhead trout			44,820	44,820
Hartsville, Mass.:				
Black bass, smallmouth		778,000		778,000
Brook trout			282,300	282,300
Rainbow trout			15,000	15,000
Catfish			6,170	6,170
La Crosse, Wis.:				
Brook trout			529,000	529,000
Loch Leven trout			226,950	226,950
Rainbow trout			219,800	219,800
Black bass, largemouth			583,225	583,225
Sunfish			25,000	25,000
Catfish			1,500	1,500
Crappie			13,420	13,420
Bellevue, Iowa:				
Pike and pickerel			1,060	1,060
Yellow perch			605	605
Black bass, largemouth			60,895	60,895
White bass			1,815	1,815
Sunfish			544,800	544,800
Catfish			5,810,000	5,810,000
Crappie			1,132,500	1,132,500
Buffalofish	315,612,500		886,000	316,498,500
Carp	268,000,000		275,300	268,275,300
Drum			200	200
Miscellaneous fishes			390,000	390,000
Guttenburg, Iowa:				
Buffalofish	28,500,000			28,500,000
Carp	24,000,000			24,000,000
Homer, Minn.:				
Yellow perch			45,975	45,975
Black bass, largemouth			15,625	15,625
Sunfish			204,000	204,000
Catfish			53,690	53,690
Crappie			70,330	70,330
Lake Mills, Wis.:				
Brook trout			88,175	88,175
Loch Leven trout			44,330	44,330
Rainbow trout			78,150	78,150
Black bass, largemouth			88,800	88,800
Black bass, smallmouth			1,815	1,815
Crappie			500	500
Lynxville, Wis.:				
Pike and pickerel			7,525	7,525
Yellow perch			126,825	126,825
Black bass, largemouth			51,445	51,445
Sunfish			128,250	128,250
Buffalofish			1,514,700	1,514,700
Catfish			3,060,000	3,060,000
Crappie			107,940	107,940
Carp			2,170,000	2,170,000
Marquette, Iowa:				
Pike and pickerel			39,500	39,500
Yellow perch			36,200	36,200
Black bass, largemouth			387,330	387,330
White bass			43,200	43,200
Sunfish			3,488,135	3,488,135
Catfish			19,141,000	19,141,000
Crappie			5,272,350	5,272,350
Buffalofish			366,200	366,200
Carp			87,900	87,900
Lake Park, Ga.:				
Black bass, largemouth			22,085	22,085
Sunfish			275,650	275,650
Catfish			140,815	140,815
Warm Springs, Ga.:				
Black bass, largemouth		258,350	65,150	323,500
Sunfish			239,500	239,500
Catfish			800	800

Stations and substations operated and the output of each, fiscal year 1938—Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
Lamar, Pa.:				
Loch Leven trout			37,205	37,205
Rainbow trout			65,015	65,015
Ogletown, Pa.:				
Brook trout			312,985	312,985
Leadville, Colo.:				
Black-spotted trout			734,700	734,700
Brook trout	1,641,000		2,132,510	3,773,510
Loch Leven trout			138,120	138,120
Rainbow trout			487,300	487,300
Creede, Colo.:				
Black-spotted trout			738,000	738,000
Brook trout	4,260,000		1,489,000	5,749,000
Loch Leven trout			47,000	47,000
Rainbow trout	480,000		597,100	1,077,100
Eagle Nest, N. Mex.:				
Black-spotted trout			228,000	228,000
Brook trout			36,000	36,000
Rainbow trout	900,800		188,000	1,088,800
Leetown, W. Va.:				
Brook trout			167,985	167,985
Loch Leven trout			19,980	19,980
Rainbow trout	15,000		328,545	343,545
Black bass, largemouth			5,080	5,080
Black bass, smallmouth			2,495	2,495
Louisville, Ky.:				
Black bass, largemouth		21,000	2,835	23,835
Black bass, smallmouth		386,000	1,140	387,140
Rock bass			2,625	2,625
Sunfish			24,935	24,935
Crappie			850	850
Mammoth Springs, Ark.:				
Black bass, largemouth		40,000	95,000	135,000
Black bass, smallmouth		215,000	121,000	336,000
Rock bass			45,000	45,000
Sunfish			227,300	227,300
Manchester, Iowa:				
Brook trout	10,000		366,250	376,250
Loch Leven trout			80,700	80,700
Rainbow trout	1,200,400		238,985	1,439,385
Black bass, smallmouth			6,500	6,500
Rock bass			10,000	10,000
Marion, Ala.:				
Black bass, largemouth			550,495	550,495
Sunfish			1,229,040	1,229,040
Tupelo, Miss.:				
Black bass, largemouth		6,500	404,385	410,885
Sunfish			196,150	196,150
Nashua, N. H.:				
Black bass, smallmouth			35	35
Brook trout			249,100	249,100
Loch Leven trout			6,000	6,000
Rainbow trout			9,200	9,200
Catfish			2,550	2,550
National Forest of N. H.:				
Brook trout	10,927,050	134,000	457,000	11,518,050
Lake trout			6,075	6,075
St. Johnsbury, Vt.:				
Brook trout		1,513,000		1,513,000
Loch Leven trout			1,800	1,800
Landlocked salmon			40,245	40,245
Black bass, smallmouth			3,500	3,500
Neosho, Mo.:				
Rainbow trout	2,189,100		15,045	2,204,145
Black bass, largemouth		116,000	12,640	128,640
Rock bass			2,555	2,555
Sunfish			78,090	78,090
Catfish			1,600	1,600
Crappie			51,500	51,500
Forest Park, Mo.:				
Black bass, largemouth			52,525	52,525
Sunfish			2,020	2,020
Natchitoches, La.:				
Black bass, largemouth		236,400	135,890	372,290
Warmouth bass			8,005	8,005
Sunfish			458,825	458,825
Tishomingo, Okla.:				
Black bass, largemouth			336,245	336,245
Sunfish			272,950	272,950
Catfish			4,550	4,550
Crappie			21,800	21,800

Stations and substations operated and the output of each, fiscal year 1938—Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
Northville, Mich.:				
Brook trout			595,950	595,950
Rainbow trout			167,665	167,665
Yellow perch			54,750	54,750
Black bass, largemouth			30,440	30,440
Black bass, smallmouth			56,795	56,795
Sunfish			31,470	31,470
Orangeburg, S. C.:				
Black bass, largemouth		25,500	276,965	302,465
Warmouth bass			2,735	2,735
Sunfish			198,280	198,280
Catfish			2,235	2,335
Crappie			12,745	12,745
Jacksonboro, S. C.:				
Shad		915,935		915,935
Hoffman, N. C.:				
Black bass, largemouth		56,000	19,000	75,000
Warmouth bass			53,000	53,000
Sunfish			402,755	402,755
Crappie			18,000	18,000
Pisgah Forest, N. C.:				
Brook trout			22,385	22,385
Loch Leven trout			12,570	12,570
Rainbow trout			39,845	39,845
Pittsford, Vt.:				
Brook trout			57,640	57,640
Rainbow trout			50,275	50,275
Grayling			10,000	10,000
Put-in-Bay, Ohio:				
Pike perch		103,330,000		103,330,000
Whitefish	480,000	70,800,000		71,280,000
Quinault, Wash.:				
Black-spotted trout			312,120	312,120
Brook trout			16,525	16,525
Rainbow trout			70,120	70,120
Steelhead trout			89,490	89,490
Sockeye salmon			2,071,970	2,071,970
Duckabush, Wash.:				
Chinook salmon			14,585	14,585
Chum salmon		4,358,700		4,358,700
Humpback salmon		720,000		720,000
Quilcene, Wash.:				
Black-spotted trout			255,500	255,500
Brook trout			19,000	19,000
Steelhead trout			322,305	322,305
Chinook salmon			397,620	397,620
Chum salmon	5,070,000	2,011,685		7,081,685
Silver salmon		406,050	113,000	519,050
Sockeye salmon			531,335	531,335
Rochester, Ind.:				
Yellow perch			5,250	5,250
Black bass, largemouth			557,800	557,800
Black bass, smallmouth			50,190	50,190
Rock bass			14,100	14,100
Sunfish			220,525	220,525
Crappie			7,535	7,535
Rochester, N. Y.:				
Brook trout			10,515	10,515
Loch Leven trout			50,000	50,000
Rainbow trout			35,000	35,000
Black bass, largemouth			7,000	7,000
Black bass, smallmouth			23,000	23,000
Saratoga, Wyo.:				
Black-spotted trout	200,490		545,725	745,215
Brook trout			754,375	754,375
Loch Leven trout			73,280	73,280
Rainbow trout			376,765	376,765
Spearfish, S. Dak.:				
Black-spotted trout			44,000	44,000
Brook trout			595,710	595,710
Rainbow trout			375,300	375,300
Springville, Utah:				
Black-spotted trout	51,660		566,025	617,685
Brook trout			572,135	572,135
Loch Leven trout			173,000	173,000
Rainbow trout	1,250,940		798,435	2,049,375
Black bass, largemouth			250	250
Sunfish			490	490
Grayling	500,100			500,100

Stations and substations operated and the output of each, fiscal year 1938—Continued

Stations, substations, and species	Eggs	Fry	Fingerlings	Total
Bear Lake, Utah:				
Black-spotted trout			39,750	39,750
Brook trout			166,100	166,100
Lake trout			10,025	10,025
Rainbow trout			60,050	60,050
Sockeye salmon, landlocked			401,200	401,200
Uvalde, Tex.:				
Rio Grande perch			5,260	5,260
Black bass, largemouth		107,100	235,770	342,870
Sunfish			14,350	14,350
Fort Worth, Tex.:				
Black bass, largemouth			114,720	114,720
Warmouth bass			400	400
Sunfish			13,975	13,975
Catfish			2,590	2,590
Crappie			32,460	32,460
San Angelo, Tex.:				
Black bass, largemouth		50,000	50,000	100,000
Sunfish			2,050	2,050
San Marcos, Tex.:				
Rio Grande perch			24,400	24,400
Black bass, largemouth		172,200	211,555	383,755
Sunfish			136,470	136,470
Crappie			5,005	5,005
Walhalla, S. C.:				
Brook trout			13,200	13,200
Rainbow trout			64,725	64,725
Welaka, Fla.:				
Black bass, largemouth		120,000	180,000	300,000
White Sulphur Springs, W. Va.:				
Brook trout			1,075,855	1,075,855
Loch Leven trout			116,200	116,200
Rainbow trout	1,196,000		434,620	1,630,620
Black bass, largemouth			2,360	2,360
Woods Hole, Mass.:				
Flatfish		452,663,000		452,663,000
Wytheville, Va.:				
Brook trout			545,585	545,585
Rainbow trout	1,280,000		361,485	1,641,485
Pike perch		500,000		500,000
Black bass, largemouth			1,885	1,885
Black bass, smallmouth		20,000	7,640	27,640
Rock bass			18,700	18,700
Sunfish			53,500	53,500
Harrison Lake, Va.:				
Black bass, largemouth			62,265	62,265
Sunfish			71,850	71,850
Catfish			1,015	1,015
Crappie			795	795
Shad		3,140,000		3,140,000
Norris, Tenn.:				
Black bass, largemouth			6,500	6,500
Sunfish			195,000	195,000
Smokemont, N. C.:				
Brook trout			66,900	66,900
Rainbow trout			90,680	90,680
Yellowstone Park, Wyo.:				
Black-spotted trout	23,606,785		5,665,600	29,272,385
Rainbow trout	479,900			479,900
Grayling	2,285,200	2,862,500		5,147,700
Jackson, Wyo.:				
Black-spotted trout		733,000	457,600	1,190,600
Brook trout			170,020	170,020
Lake trout			85,440	85,440

EGG COLLECTIONS

Egg collections during the fiscal year 1938 exceeded those of 1937 by approximately 70,000,000 eggs. As usual, the greater percentage of the collections comprised the four marine species; namely, cod, haddock, pollock, and flounder. The greater part of the eggs of these species is secured from fish caught by commercial fishermen. These eggs are fertilized and returned directly to the spawning grounds.

The recession in the take of Loch Leven trout eggs was due to the draining of the hydroelectric reservoir in the Madison Valley where these eggs are obtained.

The following table presents a comparison of the 1938 and 1937 collections:

Comparison of egg collections, fiscal years 1937 and 1938

Species	1937	1938	Species	1937	1938
Shad	20,034,000	27,523,000	Yellow perch	237,764,000	331,425,000
Whitefish	138,175,000	123,711,000	White perch		6,400,000
Chinook salmon	52,466,400	41,336,400	Cod	2,864,601,000	2,372,773,100
Chum salmon	22,383,000	16,187,000	Haddock	770,148,000	1,037,330,500
Silver salmon	2,193,000	1,300,000	Pollock	1,667,138,000	2,116,821,200
Sockeye salmon	7,653,000	3,180,000	Flatfish (flounder)	1,639,143,000	1,402,749,000
Humpback salmon		5,111,000	Mackerel	12,300,000	
Rainbow trout	22,381,000	28,241,300	Lake herring	1,600,000	2,200,000
Black-spotted trout	35,131,100	31,048,500	Glut herring	24,220,000	2,960,000
Loch Leven trout	11,563,000	1,177,500	Striped bass	1,260,000	646,000
Lake trout	918,000	1,536,900	Carp	163,500,000	329,200,000
Brook trout	32,585,000	31,061,800	Buffalofish	329,250,000	387,445,000
Steelhead trout	2,377,400	1,588,800	Lobster		8,444,000
Grayling	3,715,000	5,837,000			
Pike perch	451,450,000	256,371,000	Total	8,513,948,900	8,573,605,000

NOTES ON OPERATIONS

COMMERCIAL SPECIES

Pacific salmon.—The output of chinook, chum, silver, and sockeye salmon from the Pacific coast hatcheries was below that of last year. This was due to the decline in the take of eggs. Humpback salmon were handled for the first time since 1934. At the Clackamas, Oreg., station, and its auxiliaries, more than 20,000,000 chinook salmon eggs were collected. The collections at Mill Creek and Battle Creek substations were practically quadrupled over last season. This was ascribed to heavy rains and high water during the entire season, permitting an unusually heavy run of fish. The acquisition of the Delph Creek rearing station by transfer from the Oregon State Game Department is proving to be a valuable addition to fish-cultural activities of the Clackamas, Oreg., station. Chinook salmon and brook trout were both reared at this point. The Butte Falls, Oreg., substation collected approximately 2,000,000 chinook salmon, 80,000 silver salmon, and 113,000 steelhead trout eggs. Two new residences are under construction at this point.

The Little White Salmon and Big White Salmon, Wash., substations were largely engaged in the propagation of chinook salmon. At the former station 9,775,000 eggs were collected, while at the latter 8,640,000. The take of eggs at both of these units was below that of last year, correlated, of course, with a reduction in the run of fish. Reestablishment of the Big White Salmon station was carried on under the auspices of the United States Army Engineers, as a part of the Bonneville Dam project. Buildings were moved and ponds rearranged.

In the Puget Sound territory the Birdsview, Wash., station collected 6,700,000 salmon and trout eggs and received by transfer 1,280,000 eggs. These eggs comprised the five species of Pacific salmon and four varieties of trout. Gratifying results have been attained in establishing new runs of sockeye salmon where fingerling fish of this species were liberated during 1934 and 1935. The largest run of humpback salmon in the past 25 years occurred in the Skagit River and its tributaries during the fall of 1937.

No fish-cultural operations were carried on at the Baker Lake, Wash., substation. The salvaging of material from the hatchery building, which collapsed under heavy snow February 22, 1937, and the remodeling of the sawmill building into a hatchery, was carried on by C. C. C. enrollees. This station, which was formerly used for the propagation of salmon, will now be used for rearing trout to stock the waters of Mount Baker National Forest.

The Mount Rainier, Wash., substation collected and received from other stations approximately 1,000,000 trout eggs of various species. Most of the resulting fish were liberated in waters of Mount Rainier National Park and the Snoqualmie National Forest. From the rearing ponds at Spokane, Wash., 300,000 large fingerling trout and graylings were distributed. Most of these fish were assigned to the Conservation Departments of Washington and Idaho.

In the Olympic Peninsula, the Quinault, Wash., hatchery collected 2,000,000 sockeye salmon eggs instead of the yearly average of 10,000,000 and reared the entire output of both salmon and trout to larger fingerlings before liberating them. The dam from which the hatchery receives its water supply was rebuilt.

The substations located at Duckabush and Quilcene, Wash., concentrated on the propagation of chum salmon, but a number of other species of salmon and trout were also handled. The steelhead trout run in the Duckabush River was very small and no effort was made to collect the eggs of this species.

MARINE SPECIES

The Woods Hole, Mass., station collected 506,824,000 winter flounder eggs and distributed 452,663,000 fry. In view of the favorable reports from previous plants of flounder fry in Long Island Sound and Narragansett Bay, a number of fry were planted in these waters, but the largest percentage were liberated in the coastal waters of Massachusetts. Several hundred feet of steam pipe between the boilerhouse and hatchery building was renewed. The Massachusetts Department of Conservation was allowed the use of space in the hatchery for the purpose of carrying on an experiment in the feeding and rearing of young lobsters. During June, 94,600 lobster fry were liberated.

At the Gloucester, Mass., station several spawn-takers were placed aboard commercial fishing vessels for the purpose of collecting haddock, pollock, cod, and flounder eggs. The total number of eggs taken exceeded 5,112,000,000, which was more than 16 percent over that of 1937. Of this number, slightly over 626,000,000 were propagated at the hatchery. The balance, after fertilization, were planted directly on the spawning grounds. The lobster-cultural work was carried on in cooperation with the Massachusetts Department of Conservation. From 273 seed lobsters approximately 2,503,000 eggs were taken and placed in hatching jars and 300,000 young lobsters in the fourth larval stage were liberated in Massachusetts coastal waters. Experiments in the feeding of fish instead of meat to lobster fry were carried on. Of the several kinds of fish fed, haddock seemed to be the most suitable.

The Boothbay Harbor, Maine, station collected cod, haddock, and flounder eggs. The eggs of the two former species were fertilized and

returned to the natural spawning grounds, while the flounder eggs were hatched with a loss of only about 10 percent. The number of eggs taken from adult flounders averaged approximately 243,000 per fish, but, due to the development of slime on the spawning grounds and the disappearance of eelgrass, the station was unable to collect as many spawners as heretofore. In cooperation with the Department of Sea and Shore Fisheries of Maine, lobster culture was continued. On account of the low water temperature, coupled with the cannibalistic tendencies of this crustacean, it has been a difficult task to hold the fry until they have reached the fourth stage. However, experiments are being conducted in the heating of the hatchery water. While it is too early to reach any definite conclusions it appears that by heating the water 12 to 15 degrees, lobsters can be reared to the fourth stage in 11 to 13 days with a loss of only about 50 percent, while about only 15 to 20 percent would reach this stage under natural water temperatures.

GREAT LAKES SPECIES

Except at the Put-in-Bay, Ohio, station, the propagation of commercial species of the Great Lakes continued on a restricted basis. As the closed season on lake trout was set ahead to October 1, the Duluth, Minn., station was unable to secure any eggs of this species from the early runs of fish. After the closed season some lake-trout eggs were received from the commercial fishermen, and the State of Michigan, but, due to the scarcity of fertile males at this time of the year, the percentage of hatch from these eggs was very low. There were 7,870,000 whitefish eggs handled during the season and 5,000,000 of this number were allotted by the State of Minnesota. More than 1,000,000 lake-herring fry were planted in the inland lakes of the Superior National Forest. The output of pike perch from the Duluth station was greatly increased over that of 1937. The propagation of this species was carried on in cooperation with the Minnesota Conservation Department, fish being liberated in the waters of that State. Of the 61,500,000 eggs handled, 50,000,000 were collected by the State. In addition to the propagation of the above commercial species, the station hatched Loch Leven, brook, and rainbow trout for the supplying of rearing stations in the national forests.

The collection of pike-perch eggs at the Put-in-Bay, Ohio, station was considerably below that of last season, as weather and water conditions were unfavorable during the entire spawning period. However, approximately 256,000,000 eggs were collected from the various fields. In addition to the pike-perch work, more than 120,000,000 whitefish eggs were handled. The propagation of both species was conducted on a joint basis with the State of Ohio.

The output of commercial species from the Cape Vincent, New York, hatchery was relatively insignificant. All whitefish and lake-trout eggs handled were received from local and Canadian fishermen with the exception of 500,000 lake-trout eggs received from the Province of Ontario in exchange for brook-trout eggs from the York Pond hatchery. There was no active work at the Swanton, Vt., substation which had previously handled pike perch and yellow perch.

To supplement the Cape Vincent output, rainbow, brook, and Loch Leven trout and smallmouth black bass were propagated. The

activities of this station with regard to its output of game fish and operation of its substations will be discussed elsewhere in this report.

ANADROMOUS SPECIES, ATLANTIC COAST

This is the first year since the early 1880's during which no Atlantic-salmon eggs were hatched. This was due to inability to secure eggs from Canada, coupled with the fact that there is no local source of supply of these eggs at any of our hatcheries. The Craig Brook, Maine, station liberated 77,500 fingerlings which were reared from eggs hatched in 1937.

The Fort Belvoir, Va., station increased its output of both shad and yellow perch. Approximately 330,000,000 yellow perch and 15,000,000 shad were liberated in the Potomac River and its tributaries. Two docks that were wrecked while the station grounds were inundated by the Potomac River were repaired and creosoted.

The Edenton, N. C., station reported the largest output of shad since the season of 1922. From 10,481,000 eggs more than 7,000,000 fry were hatched. All of these were planted in Albemarle Sound and its tributaries, with the exception of 581,000 which were placed in hatchery ponds for investigation and study. Fry placed in the ponds the latter part of April were 2 inches long the first part of July. Experiments in the rearing of striped bass were also carried on. The study of factors concerning the conservation of shad was continued in cooperation with the State of North Carolina. A total of 7,221,000 yellow perch, white perch, and herring fry were hatched and liberated in local waters. The station supplemented its work with commercial varieties by propagating pondfish for the stocking of inland waters. Under a W. P. A. project, six more ponds are being built and the present reservoir enlarged. Daphnia ponds and a new residence and garage are also being constructed with the cooperation of this agency.

The Weldon, N. C., station was again operated for the hatching of striped bass on a joint basis with the Conservation Department of North Carolina. The take of eggs was below that of 1937, but the percentage of hatch was much greater. The fry were strong and vigorous.

Supplementing its pondfish activities, the Orangeburg, S. C., station again operated the Jacksonboro shad hatchery located on the Edisto River. The total collection was in excess of 1,204,000 eggs. While this number is considerably below that of some of the better seasons, it does represent a substantial increase in production over the past several years.

GAME-FISH PROPAGATION

As reduction in the average working day allows more time for recreation, the number of man-days of angling is increasing rapidly. Consequently the demands upon State conservation departments and the Bureau for the furnishing of more and larger game fish for the restocking of inland lakes and streams have increased accordingly. Likewise, there is a big demand for the stocking of waters recently impounded by various Federal agencies such as the Soil Conservation Service, and the Bureau of Reclamation. The Bureau's entire out-

put of game fish could advantageously be utilized in the stocking of waters solely under Federal control. In fact, in some of the public lands, hatcheries are operated solely for the restocking of waters within the boundaries of such areas. Biological surveys have also been conducted in a number of public domains and stocking programs drawn up. In an effort to rear the output of fish to a larger size before liberating them, with the available funds, a number of experiments in the feeding of cheaper foods such as various types of meal, frozen fish, and offal from animals and fish have been carried on. Of the 92 Bureau hatcheries that were on a productive basis this season, all but 13 handled one or more species of game fish. However, most of these units are engaged solely in the propagation of game varieties. Strictly game and pan species distributed from these stations numbered 160,655,000 during the fiscal year, which was an increase of more than 34,000,000 over that of the previous season. There was a definite increase in the production of 11 different varieties of game fish. Included in these were the largemouth and smallmouth black bass and all the main varieties of trout except Loch Leven. The following data covering the activities of the individual stations will, however, give a better understanding of the nature of the season's work.

ROCKY MOUNTAIN TERRITORY

Inasmuch as the activities at the Yellowstone Park station continued into parts of 2 fiscal years, the following data cover the summer of 1937. All previous egg-collection records for blackspotted trout, Montana grayling, and rainbow trout were broken in this field. A grand total of 47,341,960 eggs was collected, of which number 70 percent were used to restock park waters. Electrical fences were used at several of the trap sites to protect adult trout from bears during the spawning season. All suckers caught in traps were utilized for fish food or destroyed. This season marked a new high in tourist travel in Yellowstone Park and fishing was reported better than during the previous year.

At the Springville, Utah, station, 2,672,000 rainbow eggs were collected from brood stock. This station also handled brook, blackspotted, and Loch Leven trout, grayling, and a limited number of pondfish.

The Bear Lake substation reported a normal production of five species of trout. W. P. A. employees were engaged in making various improvements to buildings, ponds, and grounds.

Although the Elephant Butte, N. Mex., station was incomplete, a good production of bass and sunfish was obtained from the few ponds in service.

The Dexter, N. Mex., station's output of pondfish exceeded that of any previous year, over 1¼ million fingerling fish being distributed. Most of these were handled by the New Mexico Department of Game and Fish under the same agreement as heretofore. Three small buildings were constructed, ponds excavated, and various other improvements made to station buildings, water-supply system, and grounds, under the auspices of W. P. A.

The output of the Santa Rosa, N. Mex., substation was limited because the ponds were too unproductive of food organisms to pro-

duce more than a nominal output of fish. Pond bottoms were fertilized at intervals to overcome this situation.

The water temperature at the Glacier Park, Mont., station was so low that all fish hatched from the 2,000,000 black-spotted-trout and 250,000 rainbow-trout eggs received from the Yellowstone Park were planted in the fry stage.

In the Montana field, the Bozeman station distributed approximately 4,000,000 fry and fingerling trout and grayling. The greater percentage of this output was utilized in restocking waters under Federal control. The experiment in the rearing of Montana grayling fry to fingerlings proved very successful. The following construcion work was made possible by two W. P. A. projects: Three-stall addition to the garage, construction of two new concrete rearing ponds, painting of all buildings, graveling of driveways, cutting fire lanes through forest areas, laying of drains, and many miscellaneous repairs and improvements.

The collection of Loch Leven trout eggs in Madison Valley again fell to a new low. The Ennis, Mont., substation collected, at its four spawning camps, less than 400,000 eggs of this species. However, one-half million eggs of this variety were furnished this station by the Montana Department of Fish and Game for hatching, rearing, and planting in the Madison River and its tributaries in an effort to reestablish Loch Leven trout in this watershed. Although this station is in an incomplete status, approximately 5½ million eggs, fry, and fingerlings were distributed.

Considering the shortage of brood stock and the water levels of the lakes, the production of pondfish was satisfactory at the Miles City, Mont., substation. The output of bass was slightly lower than during the previous season but the difference in numbers was offset by the size of the fish. The production of catfish was in excess of any previous year in the history of the station.

In the Idaho territory, the Hagerman station reared its output of 1½ million trout to large fingerlings before releasing them. Extensive repairs and improvements, including the enlarging of the feed storage room, were made possible by assignment of W. P. A. employees.

The Salmon, Idaho, substation was operated during the summer months, in cooperation with the Idaho Fish and Game Department, as a base for handling the rainbow trout eggs collected at Williams Lake. The total collection for the season was slightly in excess of 4,000,000.

In the Colorado field, the Leadville station continued to cooperate with private parties in the collecting of trout eggs. The percentage the Bureau retains depends largely upon the manner in which the activities are carried on. However, the Bureau received several million eggs from such sources. The substation at Crystal Lake was utilized as a rearing unit. At the Eagle Nest, N. Mex., substation, which is operated during the summer months, approximately 2,000,000 rainbow-trout eggs were collected from Eagle Nest Lake by seining the beach for spawners. Owing to the large number of suckers ascending the creeks, this method of obtaining adult trout was necessary.

The Creede, Colo., substation collected 3,285,000 brook-trout eggs from Lake San Cristobal. These eggs were of excellent quality, eyeing up approximately 98 percent and producing vigorous and healthy fingerlings. There were 3,000,000 brook-trout eggs received from commercial trout dealers for eyeing or hatching on a cooperative basis.

The Bureau received a large quantity of eggs at a very small cost by such cooperative arrangements. A new electric-light plant was installed.

No major improvements were made at the Saratoga, Wyo., station, and the output of fish and eggs was practically the same as during the previous year.

At the Spearfish, S. Dak., station, over 1,258,000 rainbow- and 610,000 brook-trout eggs were collected from station brood stock, which is the largest collection ever made in the history of this unit. This station was again the beneficiary of a W. P. A. project which permitted the installation of several badly needed supply and drainage lines and the installation of five additional hot-water heaters for heating the water utilized in the hatching of eggs as a means of shortening the incubation period. N. Y. A. girls assigned acted in the capacity of guides showing visitors about the station and explaining the Bureau's work.

NEW ENGLAND TROUT STATIONS

The Nashua, N. H., station carried on its activities in a normal manner and achieved an average production of three species of trout.

Until the development of furunculosis the latter part of the year, the National Forest, N. H., station had the most successful year in its history. More than 14¼ million brook-trout eggs were collected, of which number approximately 10 million were shipped to State conservation departments and other Bureau stations. Extensive repairs and improvements were made with W. P. A. and C. C. C. labor. New water-supply lines were laid and several new ponds were constructed. A new electric generator was installed in the power plant. New Hampshire and Vermont contributed funds for the purchase of fish food in order that the fish could be reared to a larger size before liberation in the waters of their respective States. Gratifying results were obtained from the feeding of cheaper foods such as blood, beef brains, pork melts, horse meat, ground fish, fish spawn, and offal.

The York Pond station is so laid out that isolation of disease, such as furunculosis, is impossible. Accordingly, it was decided to destroy all fish on hand and sterilize the entire plant. Chlorine was selected as the most satisfactory and efficient agent for the purpose, and at the close of the year this distressing but necessary project was under way. None of the infected fish were planted, and if it is possible to eradicate completely a furunculosis infection the measures taken at York Pond will undoubtedly accomplish this result.

The major activity at the St. Johnsbury, Vt., station was the hatching and rearing of brook trout. Approximately 1½ million of this species were handled and also several thousand landlocked salmon, brown trout, and black bass. All three of the latter species were furnished by the State of Vermont. New cement raceways and cement bulkheads to ponds were constructed with W. P. A. labor. The hatchery foundation was also reconstructed during the year.

The Pittsford, Vt., station continued its experiments in selective breeding of trout. This season the breeders yielded eggs at the rate of 1,369 per pound of fish, which is 37 percent over the accepted rate per pound of trout. The general condition of the buildings and grounds was greatly improved by W. P. A. employees.

The Hartsville, Mass., station handled its normal quota of trout, of which several thousand were consigned to eight cooperative nurseries operating in Massachusetts and Vermont. There were 778,000 smallmouth black-bass fry collected from Wangum Lake in cooperation with the State of Connecticut under the same agreement as heretofore. Eight circular trout pools 22 feet in diameter are being constructed under the auspices of W. P. A.

In Maine the Craig Brook station collected 3¼ million brook-trout eggs, of which number approximately 2 million were shipped to other Bureau units. A limited number of rainbow and lake-trout fingerlings were distributed. The Acadia National Park was furnished 105,000 large fingerling fish to compensate them for the construction of circular rearing pools built at this station. The old plank conduit from the spring was replaced with a new iron soil-pipe line.

COMBINATION TROUT AND PONDFISH STATIONS

Owing to the overlapping of the range of trout and warm-water species, such as bass, a number of hatcheries propagate both. However, most of the establishments in this category are principally concerned in the propagation of trout, and the output of pondfish is very limited.

At the Leetown, W. Va., station, a reservoir and 20 ponds, 50 feet wide and varying in length from 150 to 600 feet, were excavated. The concrete dam and outlet box for the reservoir and the necessary kettles for these ponds were also constructed. Several thousand trout 5 inches long were distributed, most of which were released in the waters of the Monongahela and George Washington National Forests. Experiments in the feeding of various kinds of food to adult trout were carried on in order to determine the effects of different diets upon the quality of the eggs. Experiments in the stocking of warm-water rearing ponds with blunt-nosed and black-head minnows and golden shiners were conducted for the purpose of determining how many of the above forage minnows should be stocked per acre of water.

The selective breeding of rainbow trout was continued at the Neosho, Mo., station. This selective breeding has accomplished one object in that during the last season more eyed rainbow eggs were produced from a smaller number of brood stock than in any previous year in the history of the station. The output of pondfish approximated the normal average. The culture of daphnia magna was successfully carried on during the spring months.

At the Bourbon, Mo., substation, operated on a cooperative basis, the production of rainbow-trout eggs was approximately 50 percent in excess of last season and 10 percent more than any previous year.

The pond system has never been completed at the Flintville, Tenn., station, consequently the propagation of pond species is limited. The output of trout was normal and sufficient to take care of the demands in that territory. N. Y. A. employees built picnic areas for the benefit of the visiting public.

The operations at the Erwin, Tenn., station were largely of a routine nature, and the production of trout and pondfish was comparable to that of last year.

The Cape Vincent, N. Y., station, and its substations at Cortland, Watertown, and Barneveld, contributed approximately 2 million trout

for the restocking of New York waters. The output of smallmouth black bass at Cape Vincent was 20 percent in excess of last season. Several cooperative nurseries, located throughout the State of New York, were supervised.

In addition to handling a limited number of pondfish, the White Sulphur Springs, W. Va., station distributed 1,600,000 trout. Most of these were planted in the waters of West Virginia in cooperation with the State Conservation Commission. W. P. A. employees were engaged in enlarging ponds and landscaping the surrounding grounds.

The Rochester, N. Y., station, which was operated in cooperation with Monroe County, reared the greater percentage of its output of trout to legal size before liberating them in waters under the control of the county park officials. Several thousand bass were also produced for the stocking of Monroe County waters.

In addition to a normal output of trout and pondfish, the Wytheville, Va., station received 525,000 pike-perch eggs and planted the resultant fry in New River. The propagation of largemouth black bass was discontinued. The pond space which was heretofore utilized for the handling of this species was used for rearing smallmouth black bass which are more in demand for the stocking of surrounding waters. Several thousand rainbow and brook-trout fingerlings were assigned to the States of North Carolina and Virginia.

At the Lamar, Pa., station, and its auxiliary at Ogletown, approximately one-half million trout were reared and released in the waters of western and central Pennsylvania. In order that this station can collect and hatch its own eggs, a hatchery building is being constructed. C. C. C. labor was utilized in the construction of this unit and the landscaping of the surrounding grounds. A site for bass ponds was cleared.

Five cooperative feeding stations, handling approximately 700,000 trout, were operated under the direction of the Northville, Mich., station. The output of pondfish was in excess of 100,000. At the close of the year a new wall between the spring reservoir and the highway was being constructed by W. P. A. employees.

The output of the Manchester, Iowa, station varied but little from that of last year. Of the 1½ million rainbow trout eggs collected, approximately 1¼ million were shipped to other Bureau and State hatcheries. The output of pondfish was again very small. All station buildings were given two coats of paint by W. P. A. employees.

APPALACHIAN AND BLUE RIDGE TROUT STATIONS

As the Walhalla, S. C., station was incomplete at the beginning of the season, it was necessary to ship in trout from other points for rearing purposes. Consequently, only a limited number of trout were handled and they were planted in the waters of the national forests. The hatchery building was completed during the early fall which enabled this station to incubate eggs for the first time. There were 1,000,000 brook and rainbow trout eggs handled and, at the close of the year, there were on hand approximately 750,000 fish from these eggs. The Forest Service rearing stations at Franklin, N. C., and Clayton, Ga., are under the jurisdiction of this station.

The Smokemont, N. C., station, which is operated for stocking the Great Smoky Mountain National Park, reported a normal production

of brook and rainbow trout. At the close of the year 470,000 fingerling trout were being reared in various ponds throughout the park area for fall distribution.

The Pisgah Forest, N. C., station, operated solely for the stocking of waters in the Pisgah National Forest, reared the greater percentage of its output of trout to legal size before releasing them. However, considerable risk is taken in carrying fish through the winter at this station because of the probability of their succumbing to the effects of anchor ice. This station handled brook, rainbow, and brown trout.

PONDFISH STATIONS

The bass, sunfish, and other warm-water species are extremely prolific, but even in areas of their greatest natural abundance there is evidence of depletion. Intensive angling probably contributes most to this depletion. Consequently the demand for these species of fish is constantly increasing. In an effort to keep pace new units are being constructed, and pond acreage at a number of the old establishments is being extended. Additional pond space is the most essential factor for increasing the output of the warm-water species. However, the production is somewhat at the mercy of weather and other conditions over which there is no control.

Six ponds were constructed at the Marion, Ala., station, adding 22 acres of water to the pond system. Improvements were made in other ponds by removing dirt from shallow areas and utilizing it to reinforce levees. Three concrete pools were built for the purpose of propagating daphnia and holding fish during the distribution season. The metal tanks at the shipping shed were replaced with concrete ones. Weather conditions during the bass spawning season were more favorable than last year; consequently the output of this species was materially increased. A total of 752,050 bass were handled. The number of bream delivered to applicants was less than last year, but a greater poundage of this species was distributed, as the fish were practically twice as large. Efforts to propagate crappie and rock bass were largely unsuccessful.

There was no spring distribution at the Lyman, Miss., station. However, several thousand black bass fry were transferred to rearing ponds for fall distribution.

At the Tupelo, Miss., station a new drainage line was laid to four ponds. Over one-half million fingerling black bass and bream were distributed. This station's pond acreage is limited and the above figures represent a production of approximately 31,000 bass and 21,000 fingerling bream per acre.

The Division of Wild Life of the State of Georgia distributed most of the fish produced at both of the Georgia stations. The total production of largemouth black bass, sunfish, and catfish from these two units was practically the same as last season. Repairs were made to pond levees at both stations.

Despite the fact that the pond area at the Orangeburg, S. C., station was reduced, due to the construction of the concrete canal through the hatchery grounds and the reconditioning of pond bottoms, the production of fish, although less than that of last year, was on a level with the average yearly output. The greater portion of the crop was largemouth black bass and bluegill sunfish, but a limited number of

red-eared and redbreasted sunfish, crappie, catfish, and warmouth bass were distributed to applicants. In addition to the above, construction work was carried on. Station buildings were repaired and painted as a W. P. A. project.

Although the Hoffman, N. C., hatchery was under construction during the entire year, 11 one-acre ponds were completed and utilized for producing black bass, warmouth bass, sunfish, and crappie. The output from these ponds was 449,000, of which all were fingerlings except 56,000 bass fry. Many of these were utilized in stocking ponds and lakes of the land utilization project in which the hatchery is located.

The pond acreage at the Mammoth Spring, Ark., station was not increased but the output of fish was much greater than normal. The distribution of the four species propagated was in excess of 740,000. Smallmouth black bass fry were consigned to both the Arkansas and Missouri conservation departments.

At the Louisville, Ky., station the rehabilitation of buildings and grounds which were severely damaged by the 1937 flood was completed, including the excavation of a new pond. This station was favored with a W. P. A. project to assist in this work. The production of fish was below that of normal years but was in excess of that of the previous season. Brood stock was collected from local waters to replace that lost during the flood.

Although the Uvalde, Tex., station was under construction during the entire year, approximately one-half million black bass were produced and liberated in local waters.

The output from the San Marcos, San Angelo, and Forth Worth, Tex., substations was slightly in excess of that of last season.

The Welaka, Fla., station was received by transfer from the Farm Security Administration the latter part of the year. During the 3-month period that this unit was operated by the Bureau, 120,000 fry and 180,000 fingerling bass were distributed, most of which were released in the waters of the Ocala National Forest. Plans were laid for a general rebuilding of this establishment in order to make it conform to the Bureau's standards of design and construction. It is proposed to increase the pond area and construct a laboratory and other facilities. These facilities are required for research work in aquiculture which is to be undertaken here.

Fry were transferred to rearing ponds at the Palestine, W. Va., station, which is operated in cooperation with the West Virginia Conservation Commission. It is estimated that a total of 150,000 fish were on hand June 30.

The Norris, Tenn., hatchery, which is operated in cooperation with the Tennessee Valley Authority, liberated its output of fish in Norris Lake.

At the Harrison Lake, Va., station two additional ponds and a spillway to the reservoir were constructed. The output of fish was on a level with that of last year. However, efforts are being made to increase the production by planting aquatic plants in the ponds.

From the Tishomingo, Okla., station 635,500 fingerling fish were distributed. However, pond acreage at this point is not sufficient to produce enough fish to take care of all requests in that locality, and plans are being made to develop a new series of ponds.

Cold weather prevailed at the Natchitoches, La., station during the bass spawning season with consequent curtailment of the output of this species. The production of other pond species was increased and the total production was in excess of that of last season. Experiments in the propagation of spoonbill catfish were continued. The breeders appeared to be acclimated and are occasionally seen taking food, but no spawning activities were noticed.

MISSISSIPPI RIVER TERRITORY

The La Crosse, Wis., station is the headquarters for various activities of the Division in the Mississippi Valley. Rescue operations in the Upper Mississippi Wildlife and Fish Refuge were continued from Marquette, Guttenberg, Bellevue, Homer, and Fairport. A total of 43,194,485 fish was salvaged. The output of fish from the semicontrolled ponds in this area was quite successful. The total production from these ponds was 988,470 fish, of which number 975,795 were black bass—the species that is most in demand.

Approximately 1,000,000 large fingerling rainbow, brook, and Loch Leven trout were distributed from the La Crosse station. Several thousand of these trout were consigned to 26 Wisconsin and 11 Minnesota cooperative nurseries and Forest Service rearing stations. A carload of specimens was collected in this area for the Bureau's aquarium in Washington, D. C., and the aquarium in New York City.

Construction activities were continued at Genoa in cooperation with the W. P. A. In addition to the excavating of ponds, a one and one-half story, five-room residence and garage were built.

The Homer, Minn., station is being developed as a supply depot for stations in that territory and is also being equipped to render shop service in the maintenance of automotive and vessel equipment. This does not interfere with rescue operations which are of short duration only.

Production of pondfish at the Fairport, Iowa, station was on a level with that of last year. Further experiments in the culture of spoonbill catfish were undertaken at this point also, but the results were negative. In addition to the salvaging of fish from nearby waters, carp and buffalofish eggs were obtained from commercial fishermen, fertilized, and planted upon the spawning grounds.

The Rochester, Ind., station established an all-time record in the production of pondfishes. This was due partly to the creation of additional pond space at this point as well as at the Argos auxiliary. The total output of all species from both sources was 1,001,760—an increase of 582,945 over the previous year. A large number of these fish were liberated in the waters from which the station had secured its brood stock. Daphnia culture for fish food was quite successful during the spring months. The office building was completed and all buildings were painted. At the close of the year additional ponds were being built and the creek riprapped, under the auspices of the W. P. A.

The production of bass at the Lake Mills, Wis., station was approximately double that of the previous year. Trout culture was normal, 200,000 fingerlings being distributed for the stocking of waters in that locality. Three large and seven small ponds were excavated and the surrounding grounds were landscaped. This construction work was carried on with W. P. A. labor.

AQUARIUM

The displays of fresh-water food, game, forage, and predatory fish, maintained in the public aquarium of the Department of Commerce, have continued to be a magnet of public attraction. The number of specimens shown has ranged from 1,500 to 2,000. Included among these were a number of the showy tropical species which are so popular for home aquaria. As heretofore, demonstrations of model hatchery apparatus and methods were displayed, utilizing eggs of salmon, trout, whitefish, shad, and yellow perch in season.

A gradually increasing percentage of chlorine used in the District of Columbia water supply is threatening to limit the survival of the more delicate forms. Consideration is being given to the installation of dechlorination equipment.

There was acquired a series of portable aquaria which could be utilized in handling small exhibits of live fishes which might be required for educational or conservation exhibits away from the main aquarium.

As usual, the Bureau's hatcheries were drawn on freely as a source of aquarium specimens, and the distribution cars and trucks were utilized for transporting them. Consequently, the operating costs of this establishment were held at a low level in comparison with the normally heavy costs of operating such a public institution.

DISTRIBUTION OPERATIONS

A greater number of requests for consignments of fish were received this year from individuals and clubs than for several years previous, the total being 10,723. This does not include a number of blanket applications from the national forests, national parks, and other Government agencies, upon which hundreds of thousands of fish were assigned.

The distribution cars engaged in the delivery of fish to applicants this year made 91 trips and carried an average of 260 pails per trip. In making this distribution the cars traveled 60,255 paid miles and 12,307 free miles. Detached messengers traveled 68,336 paid miles and 11,022 free miles in delivering fish to applicants. As heretofore, the Bureau was favored with free transportation and reduced rates by a number of railroads. The distributing of fish by trucks, within a comparatively short radius of our hatcheries, is becoming more prevalent each year. Truck deliveries during the year aggregated 245,000 miles, which was more than double that of last year. The Bureau received the cooperation of several State conservation departments in distributing the fish produced at our hatcheries to applicants in their respective States.

Unfortunately, due to limited distribution funds, the practice of asking applicants in some localities to call at our hatcheries to receive their allotments of fish had to be continued. This, however, was not always practicable from the applicants' standpoint, and in such cases the uncalled-for fish were either assigned to State conservation departments or planted in public waters.

Summary, by States, of the distribution of fish, fiscal year 1938

State and species	Number
Alabama:	
Rainbow trout	31,500
Largemouth black bass	523,815
Rock bass	3,000
Sunfish	844,885
Catfish	340
Arizona:	
Largemouth black bass	51,500
Sunfish	17,000
Catfish	2,900
Arkansas:	
Rainbow trout	2,425
Largemouth black bass	125,180
Smallmouth black bass	208,000
Rock bass	35,500
Sunfish	245,850
Crappie	5,600
California: Chinook salmon	16,921,725
Colorado:	
Black-spotted trout	1,566,950
Brook trout	3,670,455
Loch Leven trout	585,200
Rainbow trout	1,206,080
Largemouth black bass	55,025
Sunfish	5,750
Crappie	4,750
Connecticut: Brook trout	10,500
Delaware: Largemouth black bass	200
Florida:	
Largemouth black bass	305,570
Sunfish	8,775
Georgia:	
Brook trout	5,000
Rainbow trout	43,400
Largemouth black bass	328,345
Smallmouth black bass	190,200
Sunfish	530,050
Catfish	128,660
Crappie	500
Idaho:	
Black-spotted trout	605,200
Brook trout	282,500
Loch Leven trout	41,400
Rainbow trout	1,428,360
Steelhead trout	44,820
Grayling	58,000
Illinois:	
Loch Leven trout	248,340
Largemouth black bass	38,875
Rock bass	4,000
White bass	980
Sunfish	96,400
Catfish	52,630
Crappie	248,340
Buffalo fish	444,400
Carp	181,200
Drum	235
Pickerel	180
Miscellaneous fishes	22,350
Indiana:	
Brook trout	117,075
Loch Leven trout	45,000
Rainbow trout	150,975
Yellow perch	3,450
Largemouth black bass	651,620
Smallmouth black bass	35,670
Rock bass	10,700
Sunfish	167,325
Crappie	6,335
Iowa:	
Brook trout	20,000
Loch Leven trout	3,000
Rainbow trout	48,235
Largemouth black bass	375,530
Smallmouth black bass	14,400
Rock bass	2,000
White bass	79,015
Sunfish	4,014,865
Catfish	24,929,695
Crappie	5,541,570
Buffalo fish	2,449,500
Iowa—Continued.	
Carp	363,200
Drum	200
Pike and pickerel	40,560
Yellow perch	34,205
Miscellaneous fishes	464,000
Kansas:	
Rainbow trout	1,765
Largemouth black bass	15,760
Sunfish	23,980
Catfish	7,255
Crappie	12,900
Kentucky:	
Largemouth black bass	2,025
Smallmouth black bass	196,500
Rock bass	2,025
Sunfish	65,125
Crappie	850
Louisiana:	
Largemouth black bass	374,819
Warmouth bass	8,005
Sunfish	424,825
Maine:	
Brook trout	548,905
Lake trout	12,800
Loch Leven trout	6,000
Rainbow trout	23,000
Smallmouth black bass	16,000
Flounder	534,600,000
Lobster	11,048,150
Atlantic salmon	70,500
Chinook salmon	20,000
Landlocked salmon	39,890
Maryland:	
Brook trout	2,450
Loch Leven trout	1,370
Rainbow trout	8,990
Largemouth black bass	25,590
Sunfish	65,625
Catfish	130
Crappie	3,535
Yellow perch	844,000
Massachusetts:	
Brook trout	223,900
Rainbow trout	17,950
Black bass	564,500
Catfish	8,570
Cod	152,434,500
Flounder	292,049,690
Haddock	39,287,000
Lobster	1,183,330
Pollock	257,399,000
Michigan:	
Brook trout	682,375
Loch Leven trout	62,150
Largemouth black bass	65,305
Smallmouth black bass	25,585
Sunfish	50,095
Catfish	150
Crappie	13,700
Yellow perch	55,875
Whitefish	2,850,000
Rainbow trout	104,240
Minnesota:	
Brook trout	352,950
Lake trout	622,000
Loch Leven trout	23,400
Rainbow trout	47,500
Largemouth black bass	227,605
Smallmouth black bass	1,500
Sunfish	183,600
Catfish	34,770
Crappie	71,050
Pike perch	36,390,000
Yellow perch	43,650
Lake herring	1,400,000
Whitefish	900,000
Mississippi:	
Largemouth black bass	362,920
Sunfish	374,425
Crappie	800

Summary, by States, of the distribution of fish, fiscal year 1938—Continued

State and species	Number
Missouri:	
Rainbow trout	10,520
Largemouth black bass	253,840
Smallmouth black bass	100,000
Rock bass	13,755
Catfish	2,280
Sunfish	128,030
Crappie	39,100
Montana:	
Black-spotted trout	5,866,350
Brook trout	441,910
Loch Leven trout	87,500
Rainbow trout	1,664,165
Largemouth black bass	80,565
Grayling	550,420
Sunfish	1,625
Catfish	78,230
Crappie	26,380
Nebraska:	
Brook trout	65,800
Loch Leven trout	24,000
Rainbow trout	186,070
Largemouth black bass	30,350
Sunfish	25,300
Catfish	6,750
Crappie	24,800
Yellow perch	2,000
Nevada:	
Brook trout	40,595
Rainbow trout	289,720
Sunfish	60
New Hampshire:	
Brook trout	437,125
Lake trout	1,075
Loch Leven trout	6,000
Rainbow trout	900
Smallmouth black bass	35
Catfish	150
New Jersey:	
Rainbow trout	240
Largemouth black bass	11,900
Smallmouth black bass	270
Sunfish	4,600
Catfish	30
New Mexico:	
Black-spotted trout	214,000
Brook trout	36,000
Rainbow trout	168,000
Largemouth black bass	1,246,850
Sunfish	300,000
Catfish	25,390
Crappie	11,000
New York:	
Brook trout	818,765
Lake trout	624,965
Loch Leven trout	180,010
Rainbow trout	187,510
Largemouth black bass	7,000
Smallmouth black bass	168,610
Flounder	121,160,000
North Carolina:	
Brook trout	388,500
Loch Leven trout	22,470
Rainbow trout	183,510
Largemouth black bass	227,730
Smallmouth black bass	850
Rock bass	1,800
Striped bass	415,000
Warmouth bass	53,500
Sunfish	460,795
Catfish	500
Crappie	19,525
Yellow perch	1,571,055
White perch	4,480,000
Glut herring	1,370,000
Shad	7,085,000
North Dakota:	
Rainbow trout	20,000
Largemouth black bass	31,915
Sunfish	19,510
Catfish	1,050
Crappie	26,375

State and species	Number
Ohio:	
Brook trout	5,000
Loch Leven trout	500
Rainbow trout	104,575
Largemouth black bass	63,265
Smallmouth black bass	8,025
Rock bass	8,000
Crappie	8,350
Catfish	23,750
Pike perch	103,330,000
Sunfish	104,575
Yellow perch	2,625
Whitefish	70,800,000
Oklahoma:	
Rainbow trout	575
Largemouth black bass	303,735
Sunfish	262,975
Catfish	3,600
Crappie	23,900
Oregon:	
Brook trout	350,700
Rainbow trout	6,000
Steelhead trout	305,000
Chinook salmon	2,881,700
Silver salmon	157,370
Pennsylvania:	
Brook trout	424,390
Loch Leven trout	139,980
Rainbow trout	187,435
Largemouth black bass	26,150
Smallmouth black bass	1,075
Sunfish	34,000
Catfish	1,775
Rhode Island:	
Brook trout	1,000
Smallmouth black bass	10,000
Flounder	68,272,000
South Carolina:	
Brook trout	3,100
Rainbow trout	29,725
Largemouth black bass	302,155
Warmouth bass	2,735
Sunfish	224,770
Catfish	2,335
Crappie	11,545
Shad	915,930
South Dakota:	
Black-spotted trout	44,000
Brook trout	480,710
Rainbow trout	351,000
Largemouth black bass	60,730
Sunfish	27,100
Catfish	61,200
Crappie	18,520
Tennessee:	
Brook trout	536,620
Rainbow trout	380,620
Largemouth black bass	415,865
Smallmouth black bass	5,870
Rock bass	15,000
Sunfish	304,400
Crappie	1,200
Yellow perch	1,800
Texas:	
Loch Leven trout	10,000
Largemouth black bass	988,320
Warmouth bass	400
Sunfish	29,660
Catfish	2,590
Crappie	36,555
Utah:	
Black-spotted trout	1,256,025
Brook trout	545,640
Lake trout	10,020
Loch Leven trout	173,000
Rainbow trout	726,225
Largemouth black bass	250
Grayling	500,000
Landlocked salmon	401,200
Vermont:	
Brook trout	371,465
Lake trout	10,000

Summary, by States, of the distribution of fish, fiscal year 1938—Continued

State and species	Number
Vermont—Continued.	
Loch Leven trout	1,800
Rainbow trout	19,105
Largemouth black bass	2,000
Smallmouth black bass	31,500
Grayling	10,000
Landlocked salmon	48,245
Virginia:	
Brook trout	522,920
Rainbow trout	573,355
Largemouth black bass	24,220
Smallmouth black bass	63,255
Rock bass	17,700
Sunfish	89,990
Crappie	1,840
Pike perch	500,000
Yellow perch	328,631,000
Shad	18,140,000
Washington:	
Black-spotted trout	1,920,620
Brook trout	720,690
Golden trout	255
Steelhead trout	1,251,795
Largemouth black bass	28,360
Sunfish	1,280
Crappie	1,600
Chinook salmon	18,554,859
Chum salmon	6,370,385
Humpback salmon	4,584,000
Silver salmon	742,050
Sockeye salmon	3,079,505
West Virginia:	
Brook trout	752,405
Loch Leven trout	78,640
West Virginia—Continued.	
Rainbow trout	527,355
Largemouth black bass	30,000
Smallmouth black bass	10,965
Sunfish	4,750
Catfish	2,000
Crappie	5,100
Yellow perch	500
Wisconsin:	
Brook trout	558,175
Loch Leven trout	218,230
Rainbow trout	311,800
Largemouth black bass	483,695
Smallmouth black bass	2,015
Sunfish	131,575
Catfish	3,074,920
Crappie	163,160
Buffalofish	1,534,700
Carp	2,170,000
Pike and pickerel	7,525
Yellow perch	7,500
Wyoming:	
Black-spotted trout	7,327,495
Brook trout	1,170,890
Lake trout	138,260
Loch Leven trout	88,200
Rainbow trout	572,940
Largemouth black bass	55,050
Sunfish	650
Catfish	34,950
Crappie	1,800
Grayling	2,263,000
Yellow perch	8,000

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